ENVIRONMENTAL ASSESSMENT, FINDING OF NO SIGNIFICANT IMPACT AND RECORD OF DECISION

FOR

PREDATOR DAMAGE MANAGEMENT IN OKLAHOMA

Prepared by:

UNITED STATES DEPARTMENT OF AGRICULTURE (USDA)
ANIMAL AND PLANT HEALTH INSPECTION SERVICE (APHIS)
WILDLIFE SERVICES (WS)

In Cooperation With

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INTRODUCTION

Across the United States, wildlife habitat has substantially changed as human populations have expanded and land has been transformed to meet varying human needs. These changes often compete with wildlife and have inherently increased the potential for conflicts between wildlife and people. Some species of wildlife, in particular, have adapted to and thrive in the presence of humans and the changes that have been made. These species are often responsible for the majority of conflicting activities between humans and wildlife. The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) Final Environmental Impact Statement (FEIS) summarizes the relationship in American culture of wildlife values and wildlife damage in this way (USDA 1997):

> *"Wildlife has either positive or negative values, depending on varying human perspectives and circumstances . . . Wildlife generally is regarded as providing economic, recreational and aesthetic benefits . . . , and the mere knowledge that wildlife exists is a positive benefit to many people. However, . . . the activities of some wildlife may result in economic losses to agriculture and damage to property . . . Sensitivity to varying perspectives and values is required to manage the balance between human and wildlife needs. In addressing conflicts, wildlife managers must consider not only the needs of those directly affected by wildlife damage but a range of environmental, sociocultural, and economic considerations as well."*

WS is charged by law with managing a program to reduce human and wildlife conflicts. This Environmental Assessment (EA) evaluates a portion of program responsibility. Specifically, this EA addresses the management of mammalian predators, including almost all species in the Order *Carnivora*, and opossum (*Didelphis virginiana*) to resolve conflicts in the State of Oklahoma by the WS Program.

Mammalian predators in the state include a range of species that prey on livestock and wildlife, damage property and other natural resources, and threaten human health and safety. Those that create the majority of conflicts are coyotes (*Canis latrans*), feral/free roaming dogs (*C. familiaris*), bobcats (*Lynx rufus*), raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), and opossums. Most other predators in the State have historically caused only localized damage on an occasional basis and include feral/free roaming cats (*Felis domesticus*), mink (*Mustela vison*), long-tailed weasels (*M. frenata*), badgers (*Taxidea taxus*), spotted skunks (*Spilogale putorius*), gray fox (*Urocyon cinereoargentus*), red fox (*Vulpes vulpes*) and swift fox (*Vulpes velox*). Other species that could cause damage on rare occasion are the ringtail (*Bassariscus astutus*) and hog-nosed skunks (*Conepatus mesoleucus*).

WS responds to a few requests for assistance each year involving mountain lions (*Felis concolor*), but no lions have been taken by WS in the state. In accordance with a Memorandum of Understanding (MOU) with the Oklahoma Department of Wildlife Conservation (ODWC), WS either refers complaints received for river otters (*Lutra canadensis*), and black bear (*Ursus americanus*) directly to ODWC, or provides assistance to ODWC as resources permit. WS also responds to requests involving predatory birds and reptiles; however, birds and reptiles will be considered in other NEPA documentation pursuant to this.

The Oklahoma WS program is divided into three Districts (figure 1) for the purpose of adequately addressing wildlife damage conflicts logistically. The District boundaries were established to ensure the adequate distribution of WS resources to meet the needs of the public, and to effectively supervise and monitor WS operational activities.

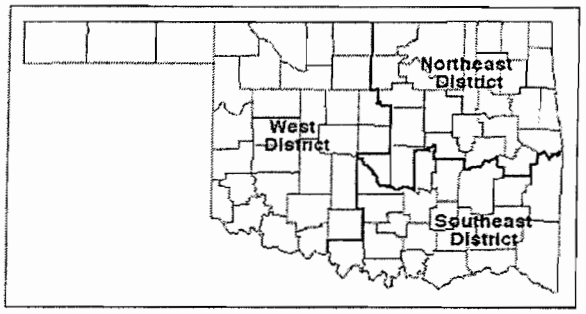

Figure 1. Oklahoma WS Districts.

An overview of the State's natural physiognomic regions includes short-grass plains in the Panhandle and mixed-grass plains over much of the remainder. Post oak-blackjack uplands are predominating in the southeast counties of the State. According to the Oklahoma GAP Analysis Project, 94.5% of the lands in the State are privately owned. Nearly all of these lands are utilized for agricultural purposes as rangeland, cropland, pasture, or forestry. (Fisher and Gregory 2004). Two major urban complexes occur in the State; Oklahoma City with adjoining cities in central Oklahoma and Tulsa with adjoining cities in the northeast corner of the state. Therefore, a wide diversity of habitats is displayed statewide, most all supporting mammalian predators. Only a very few species, such as the swift fox (*Vulpes velox*) and hog-nosed skunk, are restricted to any specific region of the State.

The Oklahoma WS Program

The WS program mission, developed through a strategic planning process, is to "provide leadership in wildlife damage management for the protection of America's agricultural, industrial and natural resources, and to safeguard public health and safety" (USDA 1989). This is accomplished through:

A) training of wildlife damage management professionals;
B) development and improvement of strategies to reduce economic losses and threats to humans from wildlife;
C) collection, evaluation, and dissemination of management information;
D) cooperative wildlife damage management programs;
E) informing and educating the public on how to reduce wildlife damage; and
F) providing technical advice and a source for limited-use management materials and equipment such as pesticides, cage traps, and pyrotechnics.

WS's Policy Manual[1] reflects the mission and provides guidance for engaging in wildlife damage control activities. WS is a cooperatively funded, service-oriented Program. WS responds directly to wildlife conflicts by request only, and as available resources permit. Before wildlife damage management is conducted, an *Agreements for Control* form must be signed by WS and the land owner/administrator/agency representative. WS works with cooperators to resolve wildlife damage problems in an effective and efficient manner, complying with all applicable federal, state, and local laws and MOUs between WS and other agencies.

Purpose

This EA analyzes predator damage management (PDM) for the protection of livestock, crops, property, natural resources, and human health and safety. Normally, according to the APHIS procedures for implementing the National Environmental Policy Act (NEPA), individual wildlife damage management actions are categorically excluded (7 CFR 372.5(c), 60 Fed. Reg. 6,000-6,003, 1995). This EA has been prepared to evaluate and determine if the proposed program may cause significant environment impacts.

[1]WS Policy Manual - Provides guidance for WS personnel to conduct wildlife damage management activities through Directives. WS Directives referenced in this EA can be found in the manual but will not be referenced in the Literature Cited Section.

PDM is conducted on private, state, county, and municipal lands, and a few classes of federal lands in Oklahoma. The State encompasses approximately 44,748,160 acres (almost 70,000 mi^2) and is divided into 77 counties. In FY 2004, WS had agreements to conduct PDM if requested, on about 9,524,875 acres which represents about 21% of the total area in the State. Even though these numbers of agreements are in place to conduct PDM if requested, not all properties have PDM actively conducted on them during a given year. In FY04, WS conducted PDM on only 2,653,688 acres of the total acres under current agreements; this represents approximately 28% of the total agreements in place for PDM, or 6% of the total acreage in the State. The majority of property under agreement for PDM, is privately owned (8,161,881 acres). Public lands under agreement for PDM in FY04 encompass 1,356,269 acres. These consist of lands under Federal, State, county or city control. Tribal PDM Agreements for FY04 comprised 6,725 acres (MIS[2] 2004).

1.1 NEED FOR ACTION

1.1.1 Summary of Proposed Action

The proposed action is to continue the current WS PDM activities in the State for the protection of livestock, crops, property, natural resources, and human health and safety. The objective of PDM as conducted in the proposed action is to minimize loss or the risk of loss to the above resource categories from predators by responding to all public requests with technical assistance (advice or demonstrations) or direct control. WS employees will give technical assistance to resource owners on a variety of methods that can be used to resolve problems and where resource owners can handle the problem themselves or when cooperative funds are not available. WS will also assist resource owners through educational programs on damage identification, prevention, and control and by providing a source of some appropriate supplies, (e.g., the loaning of cage traps and propane cannons).

Direct control support will mostly be given with methods that are difficult for the public to implement, especially those that involve lethal control measures, and where cooperative funding is available. Resource owners that are given direct control assistance will also be encouraged to use additional management strategies and sound husbandry practices when and where appropriate to help reduce problems.

Under the proposed action, Integrated Wildlife Damage Management (IWDM) will be implemented which encourages the use of all legal techniques and methods, used singly or in combination, to meet the needs of the requestors for resolving conflicts with predators. Most wildlife damage situations require professional expertise, an organized control effort, and the use several available control methods to sufficiently resolve the problem. This will be accomplished by WS personnel who are trained professionals and equipped to handle most damage situations. The resource, species, location and the type of damage, and the available biologically sound, cost-efficient and legal methods will be analyzed by WS personnel to determine the action taken to correct a conflict with a predator in accordance with the WS Decision Model (Slate et al. 1992); a complete description and examples of its applications are given in USDA (1997, Chapter 2 and Appendix N).

The proposed action will allow the use of all legal methods. A wide range of methods is available to resource owners and WS personnel. These fall into different categories including husbandry practices (night penning and guard animals), habitat and behavior modification (exclusion, chemical repellents and hazing), and population management (traps, shooting, and toxicants). Population management methods used by WS personnel will include shooting, calling and shooting, aerial hunting, traps, snares, M-44s, denning, gas cartridges, and dogs; these techniques are primarily used lethally.

[2] The Oklahoma WS Management Information System (OK MIS) is a computerized database used to track program activities. All references to MIS data for FY 2004 are preliminary, and will be finalized in 2005.

PDM will be allowed in the State under the proposed action when and where requested and on public and private lands where signed *Agreements for Control* documents are in place. All PDM will comply with federal, state, and local laws and current MOUs between WS and the various management agencies. WS personnel will communicate with other agency personnel when appropriate and necessary.

1.1.2 Need for Predator Damage Management for Protection of Livestock

Contribution of Livestock to the Economy

In 2003, agriculture cash receipts for all Oklahoma commodities totaled $4.5 billion. Of this total, livestock production, primarily cattle, hogs, sheep, and poultry, accounted for about 77% of total farm commodity cash receipts (OASS 2004).

Livestock production, particularly cattle, contributes substantially to local economies. In 2003, an estimated 5 million cattle and calves were in Oklahoma, with sales in 2003 valued at nearly $2.4 billion. There are approximately 70,000 head of sheep and lambs in Oklahoma, with 2003 sheep and lamb cash receipts of $3.6 million (OASS 2004). In Oklahoma, cattle and many sheep and goats are grazed almost exclusively on private lands in fenced, improved (planted) pastures and rangeland.

Scope of Livestock Losses

Predators are responsible for the predation (killing, harassment, or injury resulting in monetary losses to the owner) of a wide variety of livestock including cattle, goats, sheep, swine, exotic pen-raised game, other hoofed-stock, and poultry. Cattle and calves are vulnerable to predation, especially at calving (NASS 2001, Wade et al., 1982). Sheep, especially lambs, goats (primarily Angora, Spanish), and poultry are highly susceptible to year-round predation (Henne 1975, Nass 1977, 1980, NASS 2001, Tigner and Larson 1977, O'Gara et al. 1983). Livestock losses cause economic hardships to their owners and without effective PDM to protect them, predation losses are higher and, hence, the economic impacts greater (Nass 1977, 1980, Howard and Shaw 1978, Howard and Booth 1981, O'Gara et al. 1983).

Of the predators, coyotes inflict high predation rates on livestock. Coyotes accounted for 93% of all predator-killed lambs and ewes on nine sheep bands in shed lambing operations in southern Idaho and 25% of these kills were not fed upon (Nass 1977). Coyotes were also the predominant predator on sheep throughout a Wyoming study and essentially the only predator in winter (Tigner and Larson 1977).

Connolly (1992) determined that only a fraction of the total predation attributable to coyotes is reported to or confirmed by WS. He also stated that based on scientific studies and current livestock loss surveys from NASS, WS only confirms about 19% of the total adult sheep and 23% of the lambs actually killed by predators. WS Specialists do not attempt to locate every livestock kill reported by ranchers, but rather make attempts to verify sufficient losses to determine if a problem exists that requires PDM actions. Therefore, WS reports do not actually reflect the total number of livestock lost.

Although it is impossible to accurately determine the amount of livestock PDM saves from predation, it can be estimated. Scientific studies have revealed that in areas without some level of PDM, losses of adult sheep and lambs to predators can be as high as 8.4% and 29.3% of the total number of head, respectively (Henne 1975, Munoz 1977, O'Gara et al. 1983). Conversely, other studies have indicated that sheep and lamb losses are significantly lower where PDM is applied (Nass 1977, Tigner and Larson 1977, Howard and Shaw 1978; Howard and Booth 1981). In evaluating cost effectiveness of PDM, the WS programmatic EIS concluded that benefits, in terms of avoided sheep and lamb losses plus price benefits to consumers, are 2.4 times the cost of providing WS PDM services for sheep

protection in the 16 western states (USDA 1997). That analysis did not address the value of calf protection; a substantial component of WS PDM services in Oklahoma.

Loss of Livestock to Predators in Oklahoma

The most recent data from NASS on livestock losses is from the year 2001. The data indicates that predators killed 500 adult sheep valued at $64,000 and approximately 2,090 lambs valued at $92,000 during 1999 in Oklahoma. Reported statewide losses to predators for cattle and calves were 700 cattle valued at $466,000 and 6,800 calves valued at over $2 million (NASS 2001). During FY04, WS reported or verified agriculture livestock losses (including poultry, commercially raised game, and aquaculture products) to predators amounted to $240,888 (MIS 2004). Of the number reported to or verified by WS, coyote damage accounted for more losses than all other predators combined. In FY 04, coyote damage to livestock and commercial game animals accounted for over 91% of the value, followed by feral/free-roaming dogs at 4.1%, and bobcats at 3.2%. The remainder of reported and verified predation losses and damages (1.1%) were caused by red fox, gray fox, raccoon, striped skunk and river otter (MIS 2004). Other species including opossum have historically predated livestock in the State, but only rarely (MIS 1993, 1994). Commercially raised game animals are also produced in Oklahoma including deer, pheasant, quail, and various exotic animals. Predators also prey on these resources; for example, in 2004, there were 10 occurrences where coyotes and bobcats predated on these species that were confirmed by WS (MIS 2004).

WS personnel routinely confirm a portion of the losses that are caused by predators by examining evidence at sites where depredations occur. WS confirmed predation and injury to livestock in Oklahoma during 2004 totaled 22 adult cattle, 375 calves, 81 adult sheep, 59 lambs, 41 adult goats, 147 kid goats, one foal, 648 domestic fowl (ducks, geese, turkeys, chickens, pigeons and guinea fowl), and one ratite (emu), for a total estimated value of $160,993 (MIS 2004). A portion of these losses occurred as control efforts were first initiated by WS, and in some cases, in spite of ongoing control efforts by producers, who must tolerate additional costs for these activities (Jahnke et al. 1987).

Producers also experience loss or damage to livestock through disease(s) transmitted by wildlife that are either clinically infected, vectors of disease, or mechanical carriers of disease agents. An indirect potential loss to cattle producers is the rabies transmission from striped skunks; from 1990-1999, cattle were the predominant domestic animal infected by skunk strain rabies in Oklahoma, at 11% of all positive animal tested statewide. The only species to exceed this number were skunks themselves, making up 70.7% of all positive rabies cases in Oklahoma. Positive cases of rabies in horses made up 3.9% of all animals tested (Oklahoma State Department of Health (OSDH) 2004).

Mammals, particularly coyotes, are hosts to a number of tick species that can pose a health risk to livestock. Not only do mammals act as hosts to these ticks, they can act as a tick dispersal mechanism as the mammals travel through their home ranges. A series of studies by the Oklahoma State University Department of Veterinary Pathology found that the Gulf Coast tick (*Amblyomma maculatum*) is well established in Oklahoma and that establishment may be partially related to coyote population densities. On cattle, the Gulf Coast tick feeds heavily on their heads and ears, causing a condition commonly called "Gotch ear," where the ears droop and occasionally become detached from the head. These studies also found that more than 50% of the study coyotes examined were infected by the protozoan parasite *Hepatozoon americanum*; the Gulf Coast tick being the vector of this parasite. This transmissible condition is fatal to domestic dogs. It has been determined that there is an interconnecting relationship between coyotes, the ticks, and the parasites; coyotes are a reservoir for the disease in the wild (Kocan 2001).

Neosporosis, a disease that causes reproductive failure in cattle, is caused by a protozoan parasite, *Neospora caninum*. This disease is costly to ranchers, as cattle unexpectedly abort fetuses before pregnancy comes to full term, and there is no effective treatment at this time for the disease. Typically, domestic canids are the natural definitive host (Storandt 2001, Rodgers et al. 2001). Two

neosporosis outbreaks occurred at an Oklahoma dairy and cattle ranch, one in 2001 and another in 2004. In both cases, the livestock were in isolated locations and experiencing predation losses from coyotes at the times of the outbreaks. After laboratory analysis and consultation with the Diagnostic Disease Laboratory at Oklahoma State University, it was determined that coyotes were the cause for the neosporosis infection (M. Thompson, WS, pers comm. 2004).

There are concerns that bioterrorism could impact livestock health, along with wildlife populations, through the utilization of disease agents as a strategy to undermine the economics of the agriculture industry. Endemic diseases or introduced foreign animal diseases could be further spread over an area by wildlife movements. In that event, WS would assist appropriate agencies through quarantine or depopulation efforts to contain the disease outbreak. Examples of endemic diseases that could be used in bioterrorism are anthrax and plague, while examples of foreign animal diseases could be foot-and-mouth disease, Bovine spongiform encephalopathy (BSE), heartwater, and African Swine fever (McKenna 2001).

1.1.3 Need for Predator Damage Management for Protection of Crops, Property, Natural Resources and Human Health and Safety

Predators impact a number of resources in Oklahoma other than livestock. Those resources include:

- Crops - Field crops such as melons (watermelons and cantaloupes), peanuts, pecans, sweet corn, field corn, and wheat are sometimes damaged by predators such as coyotes, feral/free-roaming dogs, badgers, and raccoons. Another type of problem is improved or planted pasture damage caused by badgers burrowing. Landowners complain that the holes and uneven ground left by the burrows hamper the use of planting and mowing equipment and can sometimes result in damage to such equipment. Total losses verified by or reported to WS as a result of coyote, badger, and raccoon damage to crops and pasture in the State during FY 04 were valued at $6,060 (MIS 2004).

- Property - Animals kept as companion animals, working animals (e.g., guard or herding animals, etc.) or in institutional scientific collections are types of personal property damaged by predators in the State. Total losses of pet animals verified by or reported to WS during FY 04 were valued at $19,153. Other types of property that are damaged by predators are animal feed and other food items (raccoons, red fox, opossums, feral cats and skunks at $3,805), structures such as commercial buildings, residential houses, fences, irrigation equipment dikes, and boat docks (raccoons, badgers, opossums, skunks, feral cats and river otter at $10,025). Lawns, gardens, and golf courses can also be damaged from the digging activities of skunks and gray fox ($3,850) (MIS 2004).

- Natural Resources - There are increasing concerns among wildlife managers that predation could create problems with wildlife recruitment, particularly in areas where other factors have placed pre-existing strains (e.g., drought and fragmented habitats) on a resource species. High predation rates on ground nesting birds and their eggs is a serious problem in many parts of North America, and densities of some ground nest predators, including red fox, striped skunk and raccoons are high in human modified environments (Jimenez and Conover 2001). Research conducted in New Mexico and Oklahoma on the lesser prairie-chicken (*Tympanuchus pallidicinctus*), a candidate species under the Endangered Species Act (ESA), found that 69.1% (159 birds) of 230 radio-tagged birds died from predation. Of that number, mammals were responsible for killing 30%, or 69 of the tagged birds (Sutton 2004). In regard to big game mammals, particularly pronghorn (*Antilocapra americana*), predator management has been shown to stimulate local big game animal populations, through increased fawn recruitment (Neff et al.,1985, Shaw 1999). Predators are sometimes responsible for requests for WS assistance involving natural resources such as threatened and endangered (T&E) species protection. During FY 04 (MIS 2004), four requests were received involving wildlife predation concerns. WS may be requested to conduct PDM periodically for the protection of natural resources for other agencies where unacceptable levels of

predation may exist; examples of this would be PDM for the protection of game animals such as the pronghorn, or species protected under the ESA such as the Interior least tern (*Sterna antillarum*), or of sensitive species such as the lesser prairie-chicken. Also, WS may be requested by an appropriate federal or state wildlife agency to capture mammals such as river otter or black bear for later reintroductions as a management strategy for species viability. This was the case in FY 98-99 when WS was requested to capture river otter for reintroduction into suitable historic habitats. Seven river otter were live-captured using leghold traps by WS and supplied for this successful reintroduction from southeastern to southwestern Oklahoma (D. Dudley, WS, pers. comm. 2004, MIS 1998, 1999)

- Human Health and Safety - WS conducts limited PDM actions in the State to reduce human health and safety concerns of the public. Mammalian predators, mostly striped skunks (61.8%), were responsible for 86 reported or verified human health and safety requests in FY 04 (MIS 2004). Some human health and safety conflicts and risks arise from potentially contracting diseases directly from infected animals, or animals transporting infectious agents to humans. Concerns from disease threats involve diseases such as rabies, tularemia, leptospirosis, Rocky Mountain spotted fever, Lyme disease, and others (Sanford 1990). A field study by the Oklahoma State University Department of Veterinary Pathology conducted in northeast Oklahoma found that half of the study coyotes were infected with *Ehrlichia chaffeensis*, a tick-borne agent that causes flu-like symptoms that could be fatal to humans (Kocan 2001). Other human health issues include nuisances such as skunk odor in a house, airstrike hazards from coyotes and skunks traversing runways at airports, and others. Recommendations are generally made to consider exclusion methods to reduce these concerns, but the animals present are often removed. Other species involved in human health and safety complaints in FY 02-04 were feral cats, bats, opossum, red fox, gray fox, raccoon, feral dog, and badger (MIS 2002, 2003, 2004).

  While actual attacks from wild mammals to humans have not been documented in Oklahoma, this has occurred in other western states, sometimes resulting in injury or death to humans. Animals implicated in these attacks that are native to Oklahoma include coyotes, bobcats, mountain lion, bear and others (Baker and Timm 1998, Conover 2002). Throughout the U.S., a number of individuals keep large exotic mammals as pets, particularly large felids. According to data from the Animal Protection Institute (API), a number of these large animals that have escaped are responsible for attacks to humans, some resulting in serious injuries. These animals include African lions (*Panthera leo*), mountain lions, Bengal tiger (*Panthera tigris*) and others (API 2004). WS may be called upon to assist in the capture of escaped exotic animals. Within the last thirty years, the WS program in Oklahoma has been asked to assist in the capture of two escaped African lions and one Bengal tiger that were deemed threats to human health and safety and had in some cases, killed livestock (J. Arms, WS, pers comm. 2004), Also during the time period, WS was on call for a leopard that escaped after killing its caretaker.

  There are concerns that bioterrorism could impact human health and safety, along with wildlife populations. Endemic diseases (e.g., anthrax, plague, etc) or foreign animal diseases, whether introduced intentionally or by chance, could be further spread over an area by wildlife movements. These diseases, once viable in either a human or wildlife population, could "spill over" into the other population segment. If this occurred, WS could be asked to work with the appropriate agencies to assist in containing or monitoring the level of disease in the wildlife segment of the population.

1.2 RELATIONSHIP OF THIS ENVIRONMENTAL ASSESSMENT TO OTHER ENVIRONMENTAL DOCUMENTS

1.2.1 WS Programmatic EIS

WS issued a Final EIS on the National APHIS-WS Program (USDA 1997). Pertinent information available in USDA (1997) has been incorporated by reference into this EA.

1.2.2 Oklahoma WS PDM EAs

WS completed 2 EAs at the District level in 1997 (WS 1997 a, b). This EA will replace the 2 EAs and include most of the information to provide a statewide look at PDM.

1.3 DECISIONS TO BE MADE

WS is the lead agency for this EA, and therefore responsible for the scope, content, and decisions made. As a cooperating agency, the Oklahoma Department of Agriculture, Food and Forestry (ODAFF), along with other regulatory fish and wildlife agencies within the state provide input and direction to WS to assure that Program actions are in accordance with the desires of the State of Oklahoma.

Based on the scope of this EA, the decisions to be made are:

- Should PDM, as currently implemented, be continued in the State?
- If not, how should WS fulfill its legislative responsibilities in the State?
- Does the proposal have significant impacts requiring preparation of an EIS?

1.4 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT ANALYSIS

1.4.1 Actions Analyzed . This EA evaluates PDM to protect livestock, crops, property, and human health and safety within Oklahoma.

1.4.2 Areas of an Operational WS Wildlife Damage Management Program . Because the current program's mission is to provide assistance when requested and where funds are available, this EA analyzes impacts not only at the current program level, but at a potential program level should nonparticipating areas of the state determine that they would like to participate in WS PDM program.

1.4.3 American Indian Lands and Tribes . The methods employed and potential impacts would be the same as for any private land upon which WS could provide service. However, the Tribe, at that time, would be consulted to determine if PDM activities would impact traditional cultural properties or beliefs. Therefore, this EA would cover such actions, if requested and implemented.

1.4.4 Federal Lands . The methods employed and potential impacts would be the same on these lands as they would be on private lands upon which WS provides service. Therefore, if WS were requested to conduct PDM on federal lands for the protection of livestock, property, human health and safety, or natural resources such as T&E species, this EA would cover such actions implemented, provided PDM activity impacts for the T&E species has already been considered. However, if the requesting party was a federal agency, they would be responsible for completing the necessary NEPA documentation to cover their actions.

1.4.5 Period for Which This EA Is Valid . This EA will remain valid until WS determines that new demands for action or new alternatives have arisen that have different environmental affects and must be analyzed. At that time, this analysis and document will be supplemented or updated pursuant to NEPA. This EA will be reviewed annually to ensure that it is complete and still appropriate for the scope of PDM activities in the State.

1.4.6 Site Specificity . This EA analyzes the potential impacts of PDM as required by NEPA and addresses WS PDM activities on all lands under Agreements For Control within the State. It also addresses the impacts of PDM on areas where additional agreements with WS may be written in the reasonably foreseeable future within the State. Because the proposed action is to continue the current Program, and because the current Program's goal and responsibility is to provide service when requested within the constraints of available funding and manpower, it is conceivable that additional PDM efforts could occur. Thus, this EA anticipates potential expansion and analyzes the impacts of such expanded efforts as part of the current Program. This EA emphasizes significant issues as they relate to specific areas whenever possible; however, the issues that pertain to predator damage and resulting management are the same, for the most part, wherever they occur, and are treated as such. The standard WS Decision Model (Slate et al. 1992) and WS Directive 2.105 will be the site-specific procedure for determining methods and strategies to use or recommend for individual actions conducted by WS (See USDA 1997, Chapter 2 and Appendix N). Decisions made using the model will be in accordance with any mitigation and standard operating procedures described herein and adopted or established as part of the decision.

1.5 AUTHORITY AND COMPLIANCE

1.5.1 Authority of Federal and State Agencies in Wildlife Damage Management in Oklahoma [0]

USDA, APHIS, WS Authority

WS Legislative Authority. USDA is authorized and directed by law to protect American agriculture and other resources from damage associated with wildlife. The primary statutory authority for USDA is the *Act of March 2, 1931* and the *Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988 (7 U.S.C. 426-426c; 46 Stat. 1468)*, as amended in the Fiscal Year 2001 Agriculture Appropriations Bill, which provides that:

"The Secretary of Agriculture may conduct a program of wildlife services with respect to injurious animal species and take any action the Secretary considers necessary in conducting the program. The Secretary shall administer the program in a manner consistent with all of the wildlife services authorities in effect on the day before the date of the enactment of the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2001."

Since 1931, with the changes in societal values, APHIS/WS policies and programs place greater emphasis on the part of the Act discussing "bringing [damage] under control," rather than "eradication" and "suppression" of wildlife populations. In 1988, Congress strengthened the legislative authority of APHIS/WS with the Rural Development, Agriculture, and Related Agencies Appropriations Act. This Act states, in part:

"That hereafter, the Secretary of Agriculture is authorized, except for urban rodent control, to conduct activities and to enter into agreements with States, local jurisdictions, individuals, and

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0 3 See Chapter 1 of USDA 1997 for a complete discussion of federal laws pertaining to WS.

public and private agencies, organizations, and institutions in the control of nuisance mammals and birds and those mammal and bird species that are reservoirs for zoonotic diseases, and to deposit any money collected under any such agreement into the appropriation accounts that incur the costs to be available immediately and to remain available until expended for Animal Damage Control activities."

In Oklahoma, WS, in accordance with the provisions of Title 29, O.S.2001, §5-201, and 5-502, is authorized and permitted to take necessary action in assisting any cooperator with wildlife damage management.

Fish and Wildlife Service (USFWS)

The USFWS is responsible for managing and regulating take of those species that are listed as T&E under ESA. The ESA and WS involvement with the USFWS is discussed in greater detail in Section 1.5.2.

Federal Surface Land Management Agencies

Other Federal Surface Land Management Agencies would include those federal agencies that manage public lands in Oklahoma. These would include the U.S. Forest Service (USFS), Bureau of Land Management (BLM), and the Department of Defense (e.g., the U.S. Army Corps of Engineers, Environmental and Range Management Directives assigned to specific military installations). These agencies have the responsibility to manage the resources on federal and public lands for multiple uses including livestock grazing, timber production, recreation and wildlife habitat, while recognizing the State's authority to manage wildlife populations. If requested, WS could conduct PDM on these public lands in the State where appropriate, and in accordance with applicable laws and regulations, in order to protect livestock, wildlife, human safety or other resources. These agencies recognize WS' expertise in PDM and rely on WS to determine the appropriate methodologies for conducting PDM to reduce losses of livestock and other resources, sometimes on adjacent properties. These agencies could conduct some WDM activities themselves, to protect resources on their lands, but would be responsible for the NEPA associated with those activities. In specific regard to the USFS, land uses are outlined in National Forest Land and Resource Management Plans (LRMPs) as required by the National Forest Management Act. Oklahoma has portions of the Black Kettle National Grasslands and the Ouachita National Forest. WS provides USFS District Rangers, the Forest Supervisors, or both with Work Plans annually on those Ranger Districts where WS expects to conduct PDM. USFS, at that time, discusses the compatibility of the proposed PDM activities with the LRMP.

Oklahoma Department Wildlife Conservation (ODWC)

ODWC has the responsibility to manage all protected and classified wildlife in Oklahoma, except federally listed T&E species, regardless of the land class on which the animals are found (Title 29, §5-412, 412.1). ODWC is authorized to cooperate with WS and ODAFF for controlling predatory animals (ORS Title 29, §3-103,105, §4-135). ODWC also issues permits, including those for aerial hunting per the Fish and Wildlife Act of 1956, as amended, to landowners, lawful tenants, and lessees to take predatory animals (ORS Title 29, §4-135). However, furbearers (badger, bobcat, fox, mink, opossum, raccoon, skunk, and weasel) found destroying livestock can be taken immediately without a permit by the general public (ORS Title 29, §5-405). Coyotes are not protected in Oklahoma and are classified as predatory animals by definition under ORS Title 29, §2-132.

ODWC has the responsibility to respond to damage complaints involving river otter, black bear and ringtail under the MOU between WS and ODWC. WS will assist ODWC with these species if requested, and resources exist for that purpose. WS responds to a number of complaints that involve

suspected mountain lion damage situations in the State. Although, no damage has been confirmed by WS employees to date; under the MOU with ODWC, WS has primary responsibility to respond to complaints involving livestock depredations and ODWC is responsible for nuisance complaints.

Oklahoma Department of Agriculture (ODAFF)

ORS Title 2, Article 12 (1995) discusses ODAFF responsibility regarding predatory animal and rodent control. ORS Title 2, §12-1 authorizes ODAFF to enter into agreements with WS "*for the purpose of cooperating in the control of coyotes, bobcats, and other predatory animals causing destruction to livestock, poultry, and game*". It further states that "*pursuant to this section the control and destruction of predatory animals . . . shall be conducted in accordance with an organized and systematic plan of field operations including but not limited to hunting, trapping, or other practical methods for the control of predatory animals. Said operations shall be directly supervised by {WS}*". It also allows ODAFF to enter into agreements with other entities to conduct PDM. ODAFF currently has an MOU and Annual Work Plan with WS. These documents establish a cooperative relationship between WS and ODAFF, outline responsibilities, and set forth annual objectives and goals of each agency for resolving wildlife damage management conflicts in Oklahoma.

Oklahoma State Department of Health (OSDH)

The OSDH has the authority to enter into an MOU or agreement with WS for conducting PDM for the protection of human health from wildlife threats, and could enter into an MOU or agreement with WS to conduct such activities.

Oklahoma Statutes - Animal Control Laws

ORS Title 4, §41 authorizes the take of any animal in the Canidae (dogs) and Felidae (cats) family found chasing, injuring, or killing livestock, including exotics, off the premises of the owner. This law also holds the owner of these animals liable for damages sustained from them to livestock and other property. Additional laws can be enacted to control dogs running at large in counties with more than 200,000 people (ORS 4, §43). In Oklahoma, dog control is generally the responsibility of local governmental agencies. Local animal control officials or County sheriffs are responsible for responding to dogs that threaten, damage, or kill livestock. WS policy allows WS to assist in feral dog control at the request of local authorities upon approval of the WS State Director.

1.5.2 Compliance with Federal Laws. Several federal laws authorize, regulate, or otherwise affect WS wildlife damage management. WS complies with these laws, and consults and cooperates with other agencies as appropriate.

National Environmental Policy Act (NEPA) WS prepares analyses of the environmental impacts of Program activities to meet procedural requirements of this law. This EA meets the NEPA requirement for the proposed action in the State.

Endangered Species Act (ESA) It is federal policy, under the ESA, that all federal agencies shall seek to conserve T&E species and shall use their authorities in furtherance of the purposes of the Act (Sec.2(c)). WS conducts Section 7 consultations with USFWS to use their expertise to ensure that "*any action authorized, funded or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species . . . Each agency shall use the best scientific and commercial data available*" (Sec.7(a)(2)). WS obtained a Biological Opinion (B.O.) from USFWS in 1992 describing potential effects on T & E species and prescribing reasonable and prudent measures for avoiding jeopardy (USDA 1997, Appendix F). WS initiated formal consultation with the USFWS on several species not covered by the 1992 B.O. and the results of that consultation

are pending. In addition, WS is in the process of initiating formal consultation at the programmatic level to reevaluate the 1992 B.O. and to fully evaluate potential effects on T&E species listed or proposed for listing since the 1992 FWS B.O. In 1999, Oklahoma WS entered into an informal consultation with the USFWS to address additional T&E species in Oklahoma that were not included in the original 1992 B.O. At that time a Biological Assessment was prepared (Appendix B) to evaluate potential impacts to those species. The USFWS concurred with WS that program activities are not likely to adversely effect T&E species

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The Environmental Protection Agency (EPA) is responsible for implementing and enforcing FIFRA. All chemical methods used or recommended by the WS Program in Oklahoma are registered with and regulated by EPA and ODAFF, and used by WS in compliance with labeling procedures and requirements.

National Historic Preservation Act (NHPA) of 1966 as Amended The NHPA and its implementing regulations (CFR 36, 800) requires federal agencies to: 1) determine whether proposed activities constitute "undertakings" that can result in changes in the character or use of historic properties and, 2) if so, to evaluate the effects of such undertakings on such historic resources and consult with the State Historic Preservation Office regarding the value and management of specific cultural, archaeological and historic resources; and 3) consult with appropriate American Indian tribes to determine whether they have concerns for traditional cultural properties in areas of these federal undertakings. Activities described under the proposed action do not cause major ground disturbance and are not undertakings defined by NHPA. The Oklahoma Historic Preservation Office has indicated no concerns with PDM actions in the State.

Native American Graves Protection and Repatriation Act. The Native American Graves Protection and Repatriation Act requires Federal agencies to notify the Secretary of the Department that manages the Federal lands upon the discovery of Native American cultural items on Federal or tribal lands. Federal projects would discontinue work until a reasonable effort has been made to protect the items and the proper authority has been notified. Details regarding the relationships between these requirements, issues and PDM activities are further discussed in Chapter 2.

Executive Order 13112 of February 3, 1999, Invasive Species Non-native plants and animals that inadvertently find their way to the U.S. are of increasing concern as they threaten our natural resources. One study estimates that the total costs of invasive species in the United States amount to more than $138 billion each year (Pimentel et. al., 1999). Invasive species impact nearly half of the species currently listed as T&E under ESA.

On February 3, 1999, Executive Order 13112 was signed establishing the National Invasive Species Council (Council). The Council is an inter-Departmental body that helps to coordinate and ensure complementary, cost-effective Federal activities regarding invasive species. Council members include the Departments of the Interior, Agriculture, Commerce, State, Treasury, Transportation, Defense, and Health and Human Services, and the Environmental Protection Agency, and the U.S. Agency for International Development. Together, with the Invasive Species Advisory Committee, stakeholders, concerned members of the public, and member departments, the Council formulated an action plan for the nation. The Council issued the National Invasive Species Management Plan early in 2001 to provide an overall blueprint for Federal action. The Plan recommends specific action items to improve coordination, prevention, control and management of invasive species by the Federal agency members of the Council.

Executive Order 12898 - "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." Environmental Justice (EJ) is a movement promoting

the fair treatment of people of all races, income levels and cultures with respect to the development, implementation and enforcement of environmental laws, regulations and policies. EJ, also known as Environmental Equity, has been defined as the pursuit of equal justice and equal protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status.

EJ is a priority both within APHIS and WS. Executive Order 12898 requires Federal agencies to make EJ part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of Federal programs, policies and activities on minority and low-income persons or populations. APHIS plans to implement Executive Order 12898 principally through its compliance with the provisions of NEPA.

All WS activities are evaluated for their impact on the human environment and compliance with Executive Order 12898 to insure EJ. WS personnel use wildlife damage management methods as selectively and environmentally conscientiously as possible. It is not anticipated that the proposed action would result in any adverse or disproportionate environmental impacts to minority and low-income persons or populations.

1.6 A PREVIEW OF THE REMAINING CHAPTERS IN THIS EA

This EA is composed of 5 chapters. Chapter 2 discusses and analyzes the issues and affected environment. Chapter 3 contains a description of each alternative, alternatives not considered in detail, and mitigation and standard operating procedures (SOPs). Chapter 4 analyzes the environmental impacts associated with each alternative considered in detail. Chapter 5 contains the list of preparers of this EA, persons consulted.

2.0 CHAPTER 2 - ISSUES

Chapter 2 contains a discussion of the issues, including those that will receive detailed environmental impacts analysis in Chapter 4 (Environmental Consequences), and those that were used to develop mitigation measures and standard operating procedures, and the issues that will not be considered in detail with rationale. Pertinent portions of the affected environment will be included in this chapter in the discussion of issues used to develop mitigation measures. Additional affected environments will be incorporated into the discussion of the environmental impacts in Chapter 4.

2.1 ISSUES

The following issues have been identified as areas of concern requiring consideration in this EA.

- Effects on Target Predator Species Populations
- Effects on Nontarget Species Populations, including T&E Species
- Effects of Predator Removal on Prey Populations
- Humaneness of Control Techniques

2.2 ISSUES USED TO DEVELOP MITIGATION

2.2.1 Effects on Nontarget Species Populations, Including T&E Species

A common concern among members of the public and wildlife professionals, including WS personnel, is the potential impact of PDM control methods and activities on nontarget species, particularly T&E species. Standard operating procedures of WS include measures intended to mitigate or reduce the effects of PDM on nontarget species populations and are presented in Chapter 3.

Special efforts are made to avoid jeopardizing T&E species through biological evaluations of the potential effects and the establishment of special restrictions or mitigation measures. The results of the biological evaluation and a description of mitigation measures established are presented in Chapter 3. In 1999, Oklahoma WS entered into an informal consultation with the USFWS to address additional T/E species in Oklahoma that were not included in the original 1992 B.O. A Biological Assessment was prepared to evaluate potential impacts to those species. The conclusion was that current WS activities were "not likely to adversely affect any of the listed or proposed species". (Appendix B)

2.2.2 Humaneness of Methods Used by WS

The issue of humaneness, as it relates to the killing or capturing of wildlife is an important but very complex concept that can be interpreted in a variety of ways. Humaneness is a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. The issue of humaneness has two aspects in relation to the proposed action:

1. Animal welfare organizations are concerned that some methods used to manage wildlife damage expose animals to unnecessary pain and suffering. Research suggests that with some methods, such as restraint in leghold traps, changes in the blood chemistry of trapped animals indicate "stress." Blood measurements indicated similar changes in foxes that had been chased by dogs for about five minutes as those restrained in traps (USDA 1997). However, such research has

not yet progressed to the development of objective, quantitative measurements of pain or stress for use in evaluating humaneness.

2. Humaneness, as perceived by the livestock industry and pet owners, requires that domestic animals be protected from predators because humans have bred the natural defense capabilities out of domestic animals. It has been argued that man has a moral obligation to protect these animals from predators (USDA 1997). Predators frequently do not kill larger prey animals quickly, and will often begin feeding on them while they are still alive and conscious (Wade and Bowns 1982). The suffering apparently endured by livestock damaged in this way is unacceptable to many livestock producers.

Thus, the decision-making process involves tradeoffs between the above two aspects of humaneness. The challenge in coping with this issue is how to achieve the least amount of animal suffering with the constraints imposed by current technology, yet provide sufficient PDM to resolve problems.

WS has improved the selectivity of management devices through research and development such as pan tension devices for traps and breakaway snares. Research is continuing to bring new findings and products into practical use. Until such time as new findings and products are found to be practical, a certain amount of animal suffering will occur if PDM objectives are to be met in those situations where nonlethal control methods are not practical. Furthermore, if it were possible to quantify suffering, it is possible that the actual net amount of animal suffering would be less under the proposed action (or any other alternative involving the use of lethal methods) than under no action since suffering of livestock preyed upon by predators would be reduced if the action is successful.

WS personnel in the State are experienced and professional in their use of management methods so that they are as humane as possible under the constraints of current technology. Mitigation measures and standard operating procedures used to maximize humaneness are listed in Chapter 3.

2.2.3 The Public's Concern About Use of Chemicals

The use of toxicants by WS, which under the alternatives proposed in this EA include sodium cyanide in the M-44 device and carbon monoxide produced from the gas cartridge used for fumigating coyote, skunk, and fox dens, is regulated by EPA under FIFRA, Oklahoma Pesticide Control Laws, and WS Directives. Cyanides in the environment will diffuse in the atmosphere and be diluted, while reactions with soil compounds will convert cyanide into carbon dioxide and ammonia or other nitrogen containing compounds (EPA 1994). Based on a thorough Risk Assessment, APHIS concluded that, when WS Program chemical methods, including those referenced above, are used in accordance with label directions, they are highly selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997). EPA concluded that registered products containing sodium cyanide, used properly and in accordance with the pesticide label, will not pose unreasonable risks or adverse effects to humans or the environment (EPA1994). Mitigation measures and standard operating procedures for chemicals are listed in Chapter 3.

2.2.4 The Public's Concern About Use of Aircraft

The use of aircraft by WS, which under the alternatives proposed include the use of helicopter and/or single engine fixed wing aircraft for the purposes of aerial survey, capture and/or aerial hunting for some predators, particularly coyotes. Aerial hunting has been utilized to some degree in Oklahoma since 1944. The use of aerial hunting in the state became more prevalent after 1972 as an alternative to many predator toxicants used by the program during that time period. There have been no WS aerial accidents in Oklahoma involving crash or injury since aerial hunting began in 1944 to date (J. Steuber pers comm. 2004).

The following information was obtained from Mr. Norm Wiemeyer, Chief, Denver Field Office of the National Transportation Safety Board (NTSB, the agency that investigates aviation accidents) regarding potential aviation-related environmental concerns:

Major Ground or Forest Fires: Mr. Wiemeyer stated he had no recollection of any major fires caused by government aircraft since he has been in his position beginning in 1987. In addition, there are no reports of fires caused by WS aircraft in any state. The period of greatest fire danger typically occurs during the summer months, but WS ordinarily conducts few, if any, aerial hunting operations during the summer months.

Fuel Spills and Environmental Hazard from Aviation Accidents: The NTSB stated that aviation fuel is extremely volatile and will evaporate within a few hours or less to the point that even its odor cannot be detected (N. Wiemeyer, NTSB, to G. Littauer pers. comm. 2000). Jet A fuel also does not pose a large environmental problem if spilled. This is because a straight chained hydrocarbon with little benzene present and microbes would quickly break-down any spill by aerobic action. The quantities potentially involved in aircraft used by WS are relatively small (52 gallon maximum in a fixed-wing aircraft and 91 gallon maximum in the helicopters used by WS) and under most operating conditions, a lesser amount on board than many vehicles traveling state highways. In some cases, if a mishap were to occur, not all of the fuel would likely be spilled.

Oil and Other Fluid Spills: For privately-owned aircraft, the aircraft owner or his/her insurance company is responsible for cleanup of spilled oils and other fluids if required by the owner or manager of the property on which the accident occurred. In the case of BLM, Forest Service and National Park Service lands, the land managing agency generally requires soil to be decontaminated or removed and properly disposed. With the size of aircraft used by WS, the quantities of oil (6-8 quarts maximum for reciprocating engines) capable of being spilled in any accident are small and insignificant with respect to the potential for environmental damage. Aircraft used by WS are single engine models, so the greatest potential amount of oil that could be spilled in one accident would be about 8 quarts.

Petroleum products biodegrade through volatilization and bacterial action, particularly when exposed to oxygen (EPA 2000). Thus, small quantity oil spills on surface soils can be expected to biodegrade readily. Even in subsurface contamination situations involving underground storage facilities which would generally be expected to involve larger quantities than would ever be involved in a small aircraft accident, EPA guidelines provide for "natural attenuation" or volatilization and biodegradation in some situations to mitigate environmental hazards (EPA 2000). Thus, even where oil spills in small aircraft accidents are not cleaned up, the oil does not persist in the environment or persists in such small quantities that there is no problem. Also, WS' accidents generally would occur in remote areas away from human habitation and drinking water supplies. Thus, the risk to drinking water appears to be exceedingly low or nonexistent.

Based on a thorough Risk Assessment, APHIS concluded that, use of aerial hunting is selective to target individuals or populations, and such use has negligible impacts on the environment (USDA 1997). Mitigation measures and standard operating procedures are listed in Chapter 3.

2.2.5 American Indian and Cultural Resource Concerns

The National Historic Preservation Act of 1966, as amended, requires federal agencies to evaluate the effects of any federal undertaking on cultural resources and to consult with appropriate American Indian Tribes to determine whether they have concerns for cultural properties in areas of these federal undertakings. The Native American Graves and Repatriation Act of 1990 provides protection of American Indian burials and establishes procedures for notifying Tribes of any new discoveries.

Senate Bill 61, signed in 1992, sets similar requirements for burial protection and Tribal notification with respect to American Indian burials discovered on state and private lands.

In most cases, wildlife damage management activities have little potential to cause adverse affects to sensitive historical and cultural resources. In consideration of cultural and archeological interests, though, the WS Program solicited input from the Oklahoma State Historic Preservation Office (SHPO). Their response to WS was that wildlife damage management activities would have negligible impacts to historic properties in Oklahoma.

In consideration of American Indian cultural and archeological interests, the WS Program requested a list of the Tribes in the State from the Bureau of Indian Affairs (BIA). PDM activities will only be conducted at the request of a Tribe and, therefore, the Tribe will have ample opportunity to discuss cultural and archeological concerns with WS.

2.3 ISSUES NOT CONSIDERED IN DETAIL WITH RATIONALE

2.3.1 WS's Impact on Biodiversity

No WS wildlife management program in Oklahoma is conducted to eradicate a wildlife population. WS operates in accordance with international, federal, and state laws and regulations enacted to ensure species viability. Any reduction of a local population or group would be temporary because immigration from adjacent areas or reproduction would soon replace the animals removed. The impacts of the current WS Program on biodiversity are not significant nationwide, or statewide (USDA 1997). WS operates on a relatively small percentage of the land area of the State and WS take is a small proportion of the total population of any species as analyzed in Chapter 4.

2.3.2 Livestock Losses Are a Tax "Write Off"

There is a belief that livestock producers receive double benefits by having a partially publicly funded program to resolve predation problems and also receive deductions as a business expense on tax returns. The Internal Revenue Service tax code (Internal Revenue Code, Section 1245, 1281) does not allow for livestock losses to be "written off" if the killed livestock was produced on the ranch. WS reported and verified losses to all age classes of large livestock (cattle, sheep, goats, horses) were $220,011 in FY04. Most of these predation-related losses (81.3%) occurred, and typically occurs, to young livestock (lambs, kids, and calves) in the State (MIS 2004). Many ewes, nannies, and cows are added to herds as young livestock to replace breeding stock, and if lost to predation, they cannot be "written off" since they were not purchased. These factors limit the ability of livestock producers to recover financial losses. Producers do not receive double benefits by having a federal program to manage wildlife damage and federal tax deductions for predation losses.

2.3.3 Livestock Losses Should Be an Accepted Cost of Doing Business -- a Threshold of Loss Should Be Reached Before Providing PDM Services

WS is aware of concerns that federal wildlife damage management should not be allowed until economic losses become unacceptable. Although some losses of livestock and poultry can be expected and tolerated by livestock producers, WS has the legal direction to respond to requests for wildlife damage management, and it is Program policy to aid each requester to minimize losses. WS uses the Decision Model discussed in Chapter 3 to determine an appropriate strategy.

In a ruling for Southern Utah Wilderness Alliance, et al. vs. Hugh Thompson, Forest Supervisor for the Dixie NF, et al., the United States District Court of Utah denied plaintiffs' motion for preliminary injunction. In part, the court found that a forest supervisor need only show that damage from predators

is threatened to establish a need for wildlife damage management (Civil No. 92-C-0052A January 20, 1993).

2.3.4 No Wildlife Damage Management at Taxpayer Expense, Wildlife Damage Management Should Be Fee-Based

WS is aware of concerns that wildlife damage management should not be provided at the expense of the taxpayer or that it should be fee-based. WS was established by Congress as the agency responsible for providing wildlife damage management to the people of the United States. Funding for WS PDM comes from a variety of sources in addition to federal appropriations. Such nonfederal sources include Oklahoma general appropriations, local government funds (county or city), livestock associations, and livestock producer funds which are all applied toward program operations. Federal, state, and local officials have decided that WS needs to be conducted and have allocated funds for these activities. Additionally, wildlife damage management is an appropriate sphere of activity for government programs, since wildlife management is a government responsibility. A commonly voiced argument for publicly-funded wildlife damage management is that the public should bear the responsibility for damage to private property caused by "publicly-owned" wildlife.

2.3.5 Impacts of Predator Removal on the Public's Aesthetic Enjoyment of Predators

Wildlife is generally regarded as providing economic, recreational, and aesthetic benefits (Decker and Goff 1987), and the mere knowledge that wildlife exists is a positive benefit to many people. Some members of the public have expressed concerns that PDM could result in the loss of aesthetic benefits to the public, resource owners, or local residents. Aesthetics is the philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics is truly subjective in nature, dependent on what an observer regards as beautiful.

WS PDM activities occur on a relatively limited portion of the total area in Oklahoma, and the portion of various predator species' populations removed through WS predator damage management activities is typically low (see Chapter 4). In localized areas where WS does remove some portion of the predator population, dispersal of predators from adjacent areas typically contributes to repopulation of the area within a few weeks to a year, depending on the level of predator removal and predator population levels in nearby areas. Most of the species potentially affected by WS predator control activities are relatively abundant, but are not commonly observed because of their secretive and largely nocturnal behavior. The likelihood of getting to see or hear a predator in some localized areas could be temporarily reduced as a result of WS predator control activities, but because there is already a low likelihood of seeing a predator, this temporary local reduction in public viewing opportunity would not likely be noticeable in most cases. Impacts on overall populations would be relatively low under any of the alternatives being considered in this EA, and opportunities to view, hear, or see evidence of predators would still be available under any of the alternatives being considered. The potential minor reduction in local opportunity to view predators must be weighed against the potential economic harm suffered by livestock owners or others affected by predator damage, if predator control were not implemented.

2.3.6 Potential Effects on Wildlife of the Presence of WS Personnel Conducting PDM

Some members of the public have expressed concerns that the mere presence of WS personnel in the field during the spring months has the potential to cause harmful disturbance to wildlife, and could potentially cause some animals to be separated from their mothers or might cause the abandonment of nest sites. As stated in Chapter 1, PDM activities were only conducted on 6% of the states total acreage during FY 04. Therefore, most of the actual land area is not subjected to any field PDM activity by WS personnel. Most of the total lands in Oklahoma are privately owned and are used for agricultural purposes, and therefore subject to human activity. Also, the frequency and duration of

field activities by WS personnel on the land area worked for PDM is low. During FY 04, personnel statewide spent approximately 6,000 hours on properties during PDM projects; a small percentage of the overall human presence involved, since most of these properties are already used for agricultural purposes . Of that total time, only 1385 hours were spent conducting PDM during the months of March, April and May, the time of the year when most species bear young. Also, the typical routine of WS field personnel involved in PDM includes a trip twice per week to a property, with these trips generally occurring for about a 2-3 month period. On a particular property, the specialist would only actually walk or drive on a very small percentage of the area of the property to check for sign of the responsible predator species and to set equipment to capture or remove the offending animals. Therefore, only a small proportion is subjected to actual presence or close-proximity foot traffic or vehicle traffic by the WS specialist. Aerial hunting activities are similarly of low frequency and duration and occur similarly over only a small percentage of the land area. We are unaware of any scientific evidence that such activities result in significant adverse effects on species populations. That, combined with the small amount of relative land area on which WS conducts PDM activities, should mean WS activities would not result in any consequential effects on populations of nontarget wildlife species.

2.3.7 Concerns that the Killing of Wildlife Represents "Irreparable Harm"

Some members of the public have suggested that the killing of any wildlife represents irreparable harm. Although an individual predator or multiple predators in a specific area may be killed through WS predator control activities, this does not in any way irreparably harm the continued existence of these species. Oklahoma's historic and current populations of big game animals, game birds, furbearers and unprotected predators, which annually sustain harvests of thousands of animals, are obvious testimony to the fact that the killing of wildlife does not cause irreparable harm. Populations of some of these species are in fact much higher today than they were several decades ago (e.g., white-tailed deer (*Odocoileus virginianus*) wild turkey (*Meleagris gallopavo*), raccoons, etc, in spite of liberal hunting seasons and the killing of hundreds or thousands of these animals annually. The legislated mission of ODWC is to preserve, protect, and perpetuate all the wildlife of the State. ODWC would never allow any activity that would cause irreparable harm to the wildlife resource of the State.

2.3.8 Concerns that WS Employees Might Unknowingly Trespass onto Private Lands or Across State Boundary Lines, Either on the Ground or during Aerial Hunting Activities.

WS is well aware that it is sometimes difficult to determine land ownership in some areas, and WS field employees make diligent efforts to ensure that they do not enter properties where they do not have permission. Landowners who request assistance from WS typically provide WS representatives with very specific information not only about the property boundaries of their own land, but about the boundaries of neighboring lands as well. WS aerial hunting activities are typically conducted with the aerial crew in radio contact with a WS representative on the ground who knows the property boundaries of the area being worked.

3.0 CHAPTER 3: ALTERNATIVES INCLUDING THE PROPOSED ACTION

3.1 ALTERNATIVES ANALYZED IN DETAIL

1) Alternative 1 - Continue the Current Federal PDM Program. This is the Proposed Action as described in Chapter 1 and is the "No Action" alternative as defined by the Council on Environmental Quality for ongoing Programs.

2) Alternative 2 - No Federal WS PDM. This alternative consists of no federal PDM.

3) Alternative 3 - Technical Assistance Only. Under this alternative, WS would not conduct any direct operational PDM activities in the State. If requested, affected producers would be provided with technical assistance information only.

4) Alternative 4 - Nonlethal Required Before Lethal Control. This alternative would not allow any lethal control by WS until nonlethal methods have been tried and found to be inadequate in each depredation situation.

3.2 DESCRIPTION OF THE ALTERNATIVES

3.2.1 ALTERNATIVE 1 - Continue the Current Program (the Proposed Action)

A complete description of the proposed action was presented in Chapter 1. The discussion that follows contains further information intended to foster understanding of WS's rationale for constructing the proposed action.

Integrated Wildlife Damage Management (IWDM)

During more than 70 years of resolving wildlife damage problems, WS has considered, developed, and used numerous methods of managing damage problems (USDA 1997, P. 2-15). The efforts have involved research and development of new methods and the implementation of effective strategies to resolve wildlife damage.

The most effective approach to resolving wildlife damage is to integrate the use of several methods simultaneously or sequentially. IWDM is the implementation and application of safe and practical methods for the prevention and control of damage caused by wildlife based on local problem analyses and the informed judgment of trained personnel. The WS Program applies IWDM, commonly known as Integrated Pest Management (IPM) (WS Directive 2.105), to reduce damage through the WS Decision Model (Slate et. al. 1992) described in the FEIS (USDA 1997).

The philosophy behind IWDM is to implement effective management techniques in a cost-effective manner while minimizing the potentially harmful effects on humans, target and nontarget species, and the environment. IWDM draws from the largest possible array of options to create a combination of techniques appropriate for the specific circumstances. IWDM may incorporate cultural practices (i.e., animal husbandry), habitat modification, animal behavior (i.e., scaring), local population reduction, or any combination of these, depending on the characteristics of the specific damage problems. In selecting management techniques for specific damage situations consideration is given to the:

- Species responsible;
- Magnitude of the damage;
- Geographic extent of damage;
- Duration and frequency of the damage;
- Prevention of future damage (lethal and nonlethal techniques); and

- Environmental concerns such as T&E species in the same area.

The cost of IWDM may be secondary because of overriding environmental, legal, human health and safety, animal welfare, or other concerns.

The IWDM Strategies That WS Employs

- **Technical Assistance Recommendations** (implementation is the responsibility of the requestor). WS personnel provide information, demonstrations, and advice on many of the available IWDM techniques. Technical assistance includes demonstrations on the proper use of management devices (propane exploders, cage traps, etc.) and information and advice on animal husbandry practices, habitat management, and animal behavior modification devices. Technical assistance is generally provided following an on-site visit or verbal consultation with the requestor. Generally, several management strategies are described to the requestor for short and long-term solutions to damage problems; these strategies are based on the level of risk, the abilities of the requestor, need, and practical application. Technical assistance may require substantial effort by WS personnel in the decision making process, but the actual management is primarily the responsibility of the requestor.

- **Direct Control Assistance** (activities conducted or supervised by WS personnel). Direct control assistance is implemented when the problem cannot effectively be resolved through technical assistance and when Cooperative Agreements provide for WS direct control assistance. The initial investigation defines the nature and history of the problem, extent of damage, and the species responsible for the damage. Professional skills of WS personnel are often required to effectively resolve problems, especially if restricted-use pesticides are proposed, or the problem is complex requiring the direct supervision of a wildlife professional. WS considers the biology and behavior of the damaging species and other factors using the WS decision model (Slate et al. 1992). The methods recommended may include any combination of preventive and corrective actions that could be implemented by the requestor, WS, or other agency, as appropriate. Direct Control Assistance involves two strategies utilized by WS:

  1. **Preventive Damage Management.** Preventive damage management is applying wildlife damage management strategies before damage occurs, based on historical damage problems. As requested and appropriate, WS personnel provide information, conduct demonstrations and/or take action to prevent these historical problems from recurring. For example, in areas where substantial lamb depredation has occurred on lambing grounds, WS may provide information about guard dogs, fences or other husbandry techniques, or be requested to conduct operational PDM prior to lambing. Preventive damage management can take place on private and county lands without special authorization. For activities on federal lands, historical loss areas are delineated to identify areas where preventive PDM may occur. In addition, when conducting PDM on federal lands, WS must receive a request from the resource owner or individual that is experiencing the damage. Any pertinent issues of concern are reviewed by appropriate agencies when PDM is conducted on federal lands.

  2. **Corrective Damage Management.** Corrective damage management is applying PDM to stop or reduce current losses. As requested and appropriate, WS personnel provide information and conduct demonstrations or, with the appropriate signed agreement, take action to prevent additional losses from recurring. For example, in areas where lamb depredations are occurring, WS may provide information about guard dogs, fences or husbandry techniques, and conduct operational PDM to stop the losses.

Predator Damage Management Methods Available for Use

Most PDM methods have strengths and weaknesses in each specific predator damage situation. WS personnel can determine for each PDM activity which method or combination of methods are most appropriate and effective using the WS Decision Model. A number of methods are available for consideration in this process. WS conducts direct control operations with any of the following methods on a property only where signed *Agreements For Control On Private Property* are in place, or in the case of publicly owned lands, *Agreements For Control On Nonprivate Property*. These agreements include the intended target animals and methods to be used.

Nonlethal Methods

Livestock producer and other resource owner practices consist primarily of nonlethal preventive methods such as animal husbandry, and habitat and animal behavior modifications. Livestock husbandry and other management techniques are implemented by the livestock producer. Producers are encouraged to use these methods, based on the level of risk, need, and professional judgment on their effectiveness and practicality (USDA 1997).

1. **Animal Husbandry.** This pertains to the level of care and attention given to livestock. These practices vary between the different classes of livestock, their age and size. Animal husbandry practices include, but are not limited to, techniques such as guard animals, herders, shed lambing, and carcass removal. These techniques are often only useful in specific situations and have drawbacks. For example, guarding animals are most effective for small acreage farm flocks of sheep, but have not been proven to be effective for cattle and calf protection. In addition, guard dogs have been known to chase other wildlife besides predators; some guard dogs killed deer fawns regularly and others have influenced wild turkey distribution (Timm and Schmidt 1986). Thus, although considered a nonlethal control measure, guard dogs could have lethal or otherwise detrimental impacts on nontarget wildlife. Close confinement of cattle during calving is sometimes practical for small operations but, as a rule, not for large rangeland operations. Carcass removal usually is not feasible on extensive pasture and range operations, but usually imperative for small acreage (Wade 1982).

2. **Habitat Modifications.** These are methods that alter habitat to attract or repel certain wildlife species, or to separate livestock from predators. Habitat modifications are encouraged when and where practical, and based on the type and extent of the livestock operation. For example, clearing brushy or wooded areas in or adjacent to lambing or calving pastures may be appropriate to reduce available cover for predators; this type of habitat modification, though, is typically not allowed on National Forest or other public lands.

3. **Animal Behavior Modifications.** This refers to tactics that alter the behavior of wildlife to reduce predation or other damages. Animal behavior modification may use scare tactics or fencing to deter or repel animals that cause loss or damage to livestock or property. Some devices in this category are "predator-proof "or resistant fences, electronic guards, electronic motion sensor alarms, propane exploders, and pyrotechnics. These techniques are generally only practical in small acreage situations. Scaring devices are typically only effective for a short period of time for predators as they often become accustomed and learn to ignore them (Conover 2002). Scaring devices such as propane exploders or electronic guards are often not practical under large rangeland pasture situations and they can alter the behavior of other wildlife besides the target predators. Some types of predator-resistant fencing may be effective when it is monitored, but typically cost-prohibitive for many producers, especially for large operations. Fencing

adequate to stop predator movements can also restrict movements of game animals and other wildlife (Wade 1982, Conover 2002). In large rangeland pasture situations, predators may be enclosed with livestock by construction of predator-proof fencing; this means depredations would likely occur anyway requiring the implementation of predator removal methods to resolve depredation problems.

When appropriate, nonlethal methods sometimes utilized by WS may include some of the cooperator employed animal behavior methods previously listed as a means to help solve a predator damage problem. These methods could include pyrotechnics, alarms, flags, or propane exploders. In the proper situation, WS could also utilize many of the trapping methods listed below as a nonlethal means to capture wildlife for approved, science-based projects, (e.g., formal projects involving wildlife reintroduction into historic ranges). Projects of this type would require a specific protocol, to insure against any negative aspects typically encountered in a random translocation of an animal. The negative aspects of the translocation of wildlife are also discussed below in the lethal methods section. An example of this type of situation is described in section 1.1.3.

Lethal Methods

1. **Traps.** Leghold and cage traps, and neck and foot snares are used by WS for preventive and corrective damage management. Traps and snares can be used lethally and nonlethally, but are primarily used as lethal methods. Nontarget animals captured can often be released. However, target animals captured for damage or disease transmission situations are usually not relocated, especially with species that are numerous such as coyotes and striped skunks. In these types of situations, translocation of wild mammals is discouraged by WS policy (WS Directive 2.501) due to the stress associated with handling the relocated animal, poor survival rates due to intraspecific strife with established resident animals of the same species, and because of difficulties in adapting to new locations or habitats. Relocation of captured problem mammals is also opposed by the American Veterinary Medical Association, the National Association of State Public Health Veterinarians, and the Council of State and Territorial Epidemiologists because of the risk of disease transmission among wild mammals. There are rare cases where captured target animals could be relocated, as discussed in the section concerning nonlethal methods.

Leghold traps and foot snares are set in limited numbers in selected locations where tracks and other signs indicate coyotes or other predators have been and will likely return. Selected scent lures that would be attractive to the target animal are used to attract predators to trap set locations; when predators investigate the scent and steps on a trigger, the spring(s) are released, allowing device or snare loop to close on the upper foot or leg region of the animal. Traps and foot snares are secured either by a chain and stake driven into the ground or by a chain and "drag" which hangs up in brush soon after the captured animal leaves the site. Animals are held until WS specialists return to check their traps.

Neck Snares are set in key locations where target animals are traveling on certain trails or crawling under fences or other structures. Snares are cable loops with a locking mechanism that closes on the neck or body of the target animal as they pass through the cable loop.

Cage traps or "live traps" are enclosed wire cages with a lockable door that closes behind the animal once it enters and triggers the trap. Usually, the target animal is enticed into the trap with some type of preferred bait material. This type of trap is not limited to wire construction or to a specific dimensional size; these types of trap enclosures can be made of plastic, expanded metal, sheet metal, culverts, etc. These traps are generally only

practical for animals other than coyotes; coyotes are typically too wary to enter a confined space.

For all trapping methods, captured target animals are generally euthanized by shooting for reasons previously discussed.

2. **Firearms.** Shooting with rifles or shotguns is used for PDM when lethal methods are determined to be appropriate and firearms can be used safely and legally. Since visual confirmation is a necessary component, ground shooting is very selective for target species. In the last ten years (FY1995 to FY2004), no nontarget animal has been taken by ground shooting while conducting PDM (MIS 1995-2004). Shooting may be used in conjunction with spotlights, decoy dogs and predator calls. The animals are killed as quickly and humanely as possible.

3. **Dogs.** Hunting dogs are used to trail and capture certain problem predators such as bobcats, raccoons, mountain lion and bear. Dogs are also trained and used for coyote damage management to alleviate livestock depredations (Rowley and Rowley 1987, Coolahan 1990). Trained dogs are used primarily to locate coyotes and dens, to pursue coyotes during aerial hunting and operations, or to decoy problem coyotes into shooting range.

4. **Denning.** Denning is the practice of locating coyote, red fox, or skunk dens and fumigating the den with the gas cartridge or by excavation of the den and euthanasia of the animals (see the gas cartridge under chemical methods). Denning is only useful for canids, (e.g., coyotes), during the spring and early summer for a few months following the birth of pups. This technique is a highly selective method of take, as coyotes or other canids have little tolerance for other animal species intruding into their critical pup rearing location. Also, active canid dens are easily distinguished from other animal dens, based on the presence of tracks, droppings, hair, characteristic odor and sounds and prey remains at or near the den entrance. In reviewing the data, no nontargets have been taken by this method in Oklahoma in the last ten years (MIS 1995-2004).

5. **Aerial Hunting.** Aerial hunting consists of visually sighting target animals and shooting them from aircraft. The shooting of coyotes from fixed-winged aircraft or helicopters is used on lands where it has been authorized and determined to be appropriate. This has been a highly selective method of take in Oklahoma. From 1995 to 2004, no nontarget animal has been taken by aerial hunting. (MIS 1995-2004).

Chemical Management Methods

All chemicals used by WS are registered under FIFRA and administered by EPA and ODAFF. WS personnel that use chemical methods are certified as pesticide applicators by ODAFF and are required to adhere to all certification requirements set forth in FIFRA and the Oklahoma State pesticide control laws and regulations. No chemicals are used on federal or private lands without authorization from the land management agency or property owner/manager.

WS would currently use two chemical methods under the proposed action:

1. **Sodium Cyanide in the M-44 Device.** The M-44 cyanide ejector is a device for use in reducing wild canid (coyote, red fox, gray fox and feral dog) predation of livestock (EPA Reg. No. 56228-15), and also for protecting endangered species and public health in certain instances (Thomas 1986, Connolly 1988). The M-44 operating mechanism is a

spring-loaded plunger. Target canids are attracted to the device by fetid bait. When a target canid pulls up on the device, the plunger is released and pushes through a plastic capsule containing one gram of powdered sodium cyanide, propelling the powder into the animal's mouth. No explosive components are part of the M-44, a common misconception among some persons unfamiliar with the device. M-44s are used for corrective management and preventive, where losses have historically been documented, on state, county and private lands, and on federal lands, where authorized. WS personnel comply with the EPA label and 26 use restrictions (see USDA 1997, Appendix Q).

Sodium cyanide is odorless when completely dry, emits an odor when dampened, is strongly alkaline, and decomposes rapidly in the environment. Sodium cyanide is freely soluble in water and is a fast acting, nonspecific toxicant, inhibiting cellular respiration. Low concentrations of cyanide are detectable and frequently found in normal human blood (Feldstein and Klendshoj 1954).

Sodium cyanide is used for many purposes in the United States, including agricultural, pharmaceutical, and mining applications, and for industrial dyes. About 1.4 million tons are produced annually worldwide for these applications (Mudder, et al. 2000). In 1989, about 215 million pounds of sodium cyanide were used in North America, and the WS Program nationwide used only about 0.0001% of this (Knudson 1990). In FY 04 (MIS 2004), the OK WS program used about 10.26 pounds of sodium cyanide in the State.

2. **Gas Cartridge.** The gas cartridge is a registered fumigant (EPA Reg. No. 56228-2) comprised of 35% charcoal and 65% sodium nitrate. When ignited, the cartridge burns in the den of an animal and produces large amounts of carbon monoxide, a colorless, tasteless gas, which kills animals in the den. This technique is most often used in dens where livestock killing can be attributed to food procurement for young (Till and Knowlton 1983, Till 1992) or to euthanize pups where the parent coyotes have been removed in direct control operations. Effective den hunting generally requires good tracking conditions and is not a major method of take for predators in the State.

A quantitative risk assessment evaluating potential impacts of WS's use of chemical methods concluded that no adverse effects are expected from the above (USDA 1997, Appendix P).

3.2.2 ALTERNATIVE 2 - No Federal Predator Damage Management

This alternative would consist of no federal involvement in PDM in the State; neither direct operational management nor technical assistance would be provided from WS. It would be left up to the resource owner, the State, or other entity to conduct PDM under this option. ODAFF has formally stated that in the absence of a Federal program, PDM would continue as a State program. However, in that case, available resources and control methods to adequately conduct PDM would be drastically reduced. Also, information on future developments in nonlethal and lethal management techniques that culminate from WS's research branch would not be available to the State, producers or resource owners. With a reduction of resources, methods and information, it is probable that some PDM conducted within the private sector would consist of unsafe and improper methods. An example of this would be the illegal use of pesticides by resource owners out of frustration over the inability to reduce damage losses to a tolerable level.

3.2.3 ALTERNATIVE 3 - Technical Assistance Only

This alternative would not allow WS to conduct operational PDM in the State. WS would only provide technical assistance and make recommendations when requested. However, producers, state agency personnel, or others could conduct PDM activities including the use of traps, snares, shooting, and any nonlethal methods they deem effective.

Methods and control devices could be applied by persons with little or no training and experience. This in turn could require more effort and cost to achieve the same level of problem resolution, and could cause harm to the environment, including a higher take of nontarget animals.

3.2.4 ALTERNATIVE 4 - Nonlethal Required Before Lethal Control

This alternative would not allow the use of lethal methods by WS as described under the proposed action until nonlethal methods had been attempted to relieve damage related to predators and found to be ineffective or inadequate. Producers would still have the option of implementing nonlethal control measures and WS would continue to recommend them where appropriate, but no preventive lethal control would be allowed.

3.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL WITH RATIONALE

Several alternatives were considered but not analyzed in detail. These were not considered because of problems associated with their implementation as described below.

3.3.1 Compensation for Predator Damage Losses

The Compensation alternative would require the establishment of a system to reimburse resource owners for predation or other losses. This alternative was eliminated from further analysis because no federal or state laws currently exist to authorize such action. Under such an alternative, WS would not provide any direct control or technical assistance. Aside from lack of legal authority, analysis of this alternative in the FEIS indicates that the concept has many drawbacks (USDA 1997).

- It would require larger expenditures of money and manpower to investigate and validate all losses, and determine and administer appropriate compensation.
- It would be difficult, if not impossible, to assess and confirm losses in a timely manner for all requests, and, therefore, many losses could not be verified and uncompensated. Additionally, compensation would most likely be below full market value.
- Compensation would give little incentive to livestock and other resource owners to limit predation and/or damages with PDM strategies such as improved animal husbandry practices and fencing.
- Not all ranchers would rely completely on a compensation program and PDM activities including lethal control would likely continue as permitted by state law.

3.3.2 Bounties

Payment of funds for killing predators (bounties) suspected of causing economic losses is not supported by Oklahoma State agencies such as ODWC and ODAFF. WS concurs with these agencies because of the following.

- Bounties are generally not effective in controlling damage, especially over a wide area such as the State.
- Circumstances surrounding the take of animals are typically arbitrary and completely unregulated.

- No process exists to prohibit taking of animals from outside the damage management area for compensation purposes.

- WS does not have the authority to establish a bounty program.

3.3.3 Eradication and Long Term Population Suppression

An eradication alternative would direct all WS Program efforts toward total long term elimination of coyotes and perhaps other predator species in entire cooperating counties or larger defined areas in the State.

In Oklahoma, the eradication of predator species is not a desired goal of state agencies, although coyotes may be taken year-round with no restriction and furbearers can be taken when they are found destroying livestock or poultry. Some landowners would prefer that some species of predators be eradicated. However, eradication as a general objective for PDM will not be considered by WS in detail because:

- WS opposes eradication of any native wildlife species;

- ODWC and ODAFF oppose eradication of any native Oklahoma wildlife species;

- The eradication of a native species or local population would be extremely difficult, if not impossible to accomplish, and cost-prohibitive in most situations; and

- Eradication is not acceptable to most members of the public.

Suppression would direct WS Program efforts toward managed reduction of certain problem populations or groups. In localized areas where damage can be attributed to predation by specific groups, ODWC has the authority to increase hunting seasons and hunter tag quotas; ODAFF has the authority to control predators such as coyotes in the interest of agriculture and human health and safety. When a large number of requests for wildlife damage management are generated from a localized area, WS would consider suppression of the local population or groups of the offending species, if appropriate.

It is not realistic, practical, or allowable under present WS policy to consider large-scale population suppression as the basis of the WS Program. Typically, WS activities in the State would be conducted on a very small portion of the area inhabited by problem species.

3.3.4 The Humane Society of the United States (HSUS) Alternative

HSUS has proposed an alternative that requires: 1) "permittees evidence sustained and ongoing use of nonlethal/husbandry techniques aimed at preventing or reducing predation prior to receiving the services of the WS Program"; 2) "employees of the WS Program use or recommend as a priority the use of appropriate nonlethal techniques in response to a confirmed damage situation"; 3) "lethal techniques are limited to calling and shooting and ground shooting, and used as a last resort when use of husbandry and/or nonlethal controls have failed to keep livestock losses below an acceptable level"; and 4) "establish higher levels of acceptable loss levels on public lands than for private lands."

The components of the proposed HSUS alternative have been analyzed in the alternatives contained in this EA and through court rulings. The HSUS alternative would not allow for a full range of IWDM techniques to resolve wildlife damage. In addition, WS is charged by law to protect American agriculture, despite the cost of control. Further, in the case Southern Utah Wilderness Society et al. v.

Hugh Thompson et al. U.S. Forest Service (Civil No. 92-C-0052A 1993), the court clearly stated that, "The agency need not show that a certain level of damage is occurring before it implements a WS Program. . . . Hence, to establish need for WS, the forest supervisors need only show that damage from predators is threatened." Thus, judicial precedence was set and found that it is not necessary to establish a criterion, such as percentage of loss of a herd to justify the need for WS action. Preventive and corrective control actions are therefore justified by a reasonable determination that damage by predators is threatened. The alternatives selected for detailed analysis in this EA encompass a reasonable range as required by NEPA and include some of the suggestions in the HSUS proposal, and it is believed that inclusion of this alternative would not contribute new information or options for consideration and analysis that are not already being considered and available in IWDM as used by WS.

3.3.5 Lithium Chloride as an Aversive Agent

Lithium chloride has been tested as a taste aversion agent to condition coyotes to avoid livestock, especially sheep. Despite extensive research, the efficacy of this technique remains unproven (Conover et al. 1977; Sterner and Shumake 1978; Burns 1980, 1983; Horn 1983; Johnson 1984; Burns and Connolly 1980, 1985). The uses of taste aversion techniques are specific only to treated single prey items under exclusive conditions. Lithium chloride is currently unregistered by EPA or ODAFF, and therefore cannot be used or recommended for this purpose.

3.3.6 Immunocontraceptives or Sterilization Should Be Used Instead of Lethal PDM. Contraceptive measures for mammals can be grouped into four categories: surgical sterilization, oral contraception, hormone implantation, and immunocontraception (the use of contraceptive vaccines). These techniques would require that each individual animal receive either single, multiple, or possibly daily treatment to successfully prevent conception. The use of oral contraception, hormone implantation, or immunocontraception would be subject to approval by Federal and State regulatory agencies.

These methods were not analyzed in detail in the EA because: (1) surgical sterilization would require that each animal be captured and sterilization conducted by licensed veterinarians and would therefore be extremely labor intensive and expensive; and (2) there are not currently any Federally or State approved chemosterilants available for operational use in predator control.

Bromley and Gese (2001a, 2001b) conducted studies to determine if surgically sterilized coyotes would maintain territorially and pair bond behavior characteristics of intact coyotes, and if predation rates by sterilized coyote pairs would decrease. Their results suggested that behaviorally, sterile coyote pairs appeared to be no different than intact pairs except for predation rates on lambs. Reproductively intact coyote packs were 6 times more likely to prey on sheep than were sterilized packs (Bromley and Gese 2001b). They believed this occurred because sterile packs did not have to provision pups and food demands were lower. Therefore, sterilization could be an effective method to reduce lamb predation if enough alpha (breeding) pairs could be captured and sterilized. During Bromley and Gese's (2001a, 2001b) studies: (1) they captured as many coyotes as possible from all packs on their study area, (2) they controlled coyote exploitation (mortality) on their study area and survival rates for coyotes were similar to those reported for mostly unexploited coyote populations, unlike most other areas, and (3) they concluded a more effective and economical method of sterilizing resident coyotes was needed to make this a practical management tool on a larger scale (Bromley and Gese 2001b).

As alternative methods of delivering sterilants are developed, sterilization may prove to be a more practical tool in some circumstances (DeLiberto et al. 1998). Reduction of local populations could conceivably be achieved through natural mortality combined with reduced fecundity. No predators would be killed directly with this method, however, and treated predators could continue to cause damage. Populations of dispersing predators would probably be unaffected.

Potential environmental concerns with chemical sterilization would still need to be addressed, including safety of genetically engineered vaccines to humans and other wildlife. At this time, chemical sterilization is controversial among wildlife biologists and many others. In any event, no contraceptive agents or methods are currently registered and are thus not legal for use or practical for use on predators in most areas. Should any become registered in the future, WS could consider them among the methods to be used in their program. Any additional NEPA analyses deemed necessary at that time would be conducted. The use of contraceptives is not realistic at this point, since effective and legal methods of delivering contraceptives to predators are not yet available for operational use.

3.4 MITIGATION AND STANDARD OPERATING PROCEDURES FOR WILDLIFE DAMAGE MANAGEMENT TECHNIQUES

3.4.1 Mitigation in Standard Operating Procedures (SOPs)

Mitigation measures are any features of an action that serve to prevent, reduce, or compensate for impacts that otherwise might result from that action. The current WS Program, nationwide and in Oklahoma, uses many such mitigation measures and these are discussed in detail in Chapter 5 of the FEIS (USDA 1997). Some key mitigating measures pertinent to the proposed action and alternatives that are incorporated into WS's Standard Operating Procedures include the following.

- The WS Decision Model, which is designed to identify effective wildlife damage management strategies and their impacts, is consistently used.
- Traps and snares are not set within 30 feet of exposed carcasses to prevent the capture of scavenging birds. The exception to this is for the capture of cougar and black bear because the weight of these target animals allows foot snare tension adjustments to exclude the capture of smaller nontarget animals such as scavenging birds.
- Leghold trap underpan tension devices and foot snare trigger tension devices are used throughout the Program to reduce the capture of nontarget wildlife that weigh less than the target species.
- Nontarget animals captured in leghold traps or foot snares are released unless it is determined by WS Specialists that they will not survive.
- Conspicuous, bilingual warning signs alerting people to the presence of traps, snares and M-44s are placed at major access points when they are set in the field.
- Reasonable and prudent alternatives and measures are established through consultation with FWS and implemented to avoid adverse impacts to T&E species.
- EPA-approved label directions are followed for all pesticide use.
- All State WS Specialists who use restricted chemicals are trained and certified by WS personnel or others who are experts in the safe and effective use of these materials or are supervised by such persons according to ODAFF's definition (ORS 2, §3-81).
- The M-44 sodium cyanide devices are used following EPA label requirements (see FEIS Appendix Q for label and use restrictions).
- Training and certification is required of crewmembers for aerial hunting projects. This certification process includes training in the use of personal protective equipment, emergency procedures in the event of an aerial accident, target identification and additional firearms training

specific to aircraft. Commercial rated pilots must pass a Class II physical exam as defined by the Federal Aviation Administration (FAA) and are subjected to recurrent WS safety training for low-level aircraft. Aircraft are inspected to meet or exceed Part 135 FAA aircraft standards.

Some additional mitigating factors specific to the current Program include the following.

- Management actions are directed toward localized populations or groups of target predator species and/or individual offending members of those species. Generalized population suppression across the State will not be conducted.

- Although hazards to the public from PDM devices and activities are low according to a formal risk assessment (USDA 1997, Appendix P), hazards to the public and their pets are even further reduced by the fact that PDM activities are primarily conducted on private or other properties where public access is highly restricted or denied.

- To limit the nontarget take of Swift fox in locations where livestock losses to coyotes are not verified, if a Swift fox is taken with an M-44 device, M-44s will be replaced with another suitable method within a 3.5 km radius where the nontarget Swift fox was taken.

3.4.2 Additional Mitigation Specific to the Issues

The following is a summary of additional mitigation measures that are specific to the issues listed in Chapter 2 of this document.

3.4.2.1 Effect on Target Predator Species Populations

- PDM activities to resolve coyote and other predator damage problems are directed at taking action against individual problem animals, or local populations or groups, and not by attempting to eradicate populations in the entire area or region.

- WS kill is monitored by considering "Total Harvest" and estimated population numbers of key species. These data are used to assess cumulative effects so as to maintain the magnitude of harvest below the level that would impact the viability of populations of native species (See Chapter 4).

3.4.2.2 Effects on Nontarget Species Populations Including T&E Species

- WS personnel are highly experienced and trained to select the most appropriate method(s) for taking problem animals with little impact to nontarget animals.

- Leghold trap and foot snare underpan tension devices are used to reduce hazards to nontarget wildlife that weigh less than the target species.

- Nontarget animals captured in leghold traps or foot snares are released unless it is determined by WS Specialists that they will not survive.

- WS has consulted with the FWS about the potential impacts of all current PDM methods on T&E species, and abides by the reasonable and prudent alternatives and measures established as a result of that consultation. For the full context of the Biological Opinion, see the WS FEIS, Appendix F (USDA 1997). The primary T&E species of concern covered by the formal consultation that occurs in Oklahoma is the bald eagle (*Haliaeetus leucocephalus*). Those measures and their terms and conditions as related to the proposed action and alternatives described in this EA are as follows.

- WS personnel will contact either the local ODWC office or the appropriate FWS regional or field office to determine nest and roost locations for Bald Eagles.
- The appropriate FWS office shall be notified within five days of the finding of any dead or injured bald eagle. Cause of death, injury, or illness, if known, would be provided to those offices.
- If a bald eagle is incidentally taken from the Southwest population, use of the control method will be halted immediately, and WS will reinitiate consultation.
- Leghold traps (except those used to trap mountain lions) shall be placed a minimum of 30 feet from above ground bait sets.
- When bald eagles are in the immediate vicinity of a proposed wildlife damage management Program, WS personnel will conduct daily checks for carcasses or trapped individuals.

- Potential impacts on other T&E species in the State have been assessed and no adverse impacts are likely to occur from WS actions. In an informal consultation with FWS, (Appendix B) they have concurred that WS activities are not likely to adversely affect T&E species in the State.

3.4.2.3 Impact of Predator Removal on Prey Populations

- State activities are directed at taking action against individual problem animals, or local populations or groups to resolve problems associated with them. It is generally accepted that predators do not influence prey numbers substantially, rather the reversal tends to be true, in that the cyclic nature of most prey species may affect predator numbers (Clark 1972, Wagner and Stoddart 1972). This is especially true of highly fecund species such as rodents and rabbits, but less so for species such as deer. However, the impact of predator removal in the State has been assessed and will not likely impact prey species except in potentially very local areas.

- WS currently has agreements for PDM on approximately 21% of the land area of the State and generally conducts PDM activities on less than 10% of the land area in any one year (6% in 2004), and therefore, will not impact prey species on 79 - 90% or more of the land in the State.

3.4.2.4 Humaneness of Methods Used by WS

- WS personnel attempt to kill captured target animals that are slated for lethal removal as quickly and humanely as possible. In most field situations, a shot to the brain with a small caliber firearm is performed which causes rapid unconsciousness followed by cessation of heart function and respiration. This is in concert with the American Veterinary Medical Association's definition of euthanasia. In some situations, accepted chemical immobilization and euthanasia methods are used.

- Research continues with the goal of improving the selectivity and humaneness of management devices.

- WS Specialists use underpan tension devices which are designed to exclude nontarget animals that weigh less than the target species.

- WS specialists use trap lures and set traps in locations that are conducive to capturing the target animal, but minimize potential impact to nontarget species.

4.0 CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

Chapter 4 provides the information needed for making informed decisions in selecting the appropriate alternative for meeting the purpose of the proposed action. This chapter analyzes the environmental consequences of each alternative in relation to the issues identified for detailed analysis in Chapter 2.

4.1 ENVIRONMENTAL CONSEQUENCES

This section analyzes the environmental consequences of each alternative in comparison with the proposed action to determine if the real or potential impacts are greater, lesser or the same.

4.1.1 Cumulative and Unavoidable Impacts . Cumulative and unavoidable impacts will be discussed in relationship to each of the potentially affected species analyzed in this chapter.

4.1.2 Non-significant Impacts . The following resource values within the State are not expected to be significantly impacted by any of the alternatives analyzed: soils, geology, minerals, water quality/quantity, floodplains, wetlands, visual resources, air quality, prime and unique farmlands, aquatic resources, timber and range. These resources will not be analyzed further.

4.1.3 Irreversible and Irretrievable Commitments of Resources . No irreversible or irretrievable commitments of resources are expected, other than minor uses of fuels for motor vehicles and other similar materials. These will not be discussed further.

4.2 ISSUES ANALYZED IN DETAIL

4.2.1 Effects on Target Predator Populations

4.2.1.1 Alternative 1. - Continue the Current Federal WS PDM Program (The Proposed Action as described in Chapter 1)

Coyote Population Information and Impact Analysis

As previously discussed, coyotes are the major damage-causing predator the state, with $244,035 in reported and/or verified damage to resources in during FY 04 (MIS 2004). Coyote damage management is therefore the major focus of WS PDM efforts in the State.

To discuss the impacts of various environmental constraints and external factors on coyote populations and density, it is essential to understand the basic mechanisms that play a role in the coyote's response to constraints and actions. This species is often characterized by biologists and rangeland managers as having a unique resilience to change because they have a strong ability to adapt to adverse conditions and persevere.

Determinations of absolute densities for coyote populations are frequently limited to educated guesses (Knowlton 1972). Coyotes are highly mobile animals with home ranges (territories) that vary by sex and age of the animal and season of the year (Pyrah 1984, Althoff 1978, Todd and Keith 1976). Definitive coyote spatial organization is unclear (Windberg and Knowlton 1988, Messier and Barrette 1982). Coyote population densities will vary depending on the time of year, food abundance, and habitat. Coyote densities have ranged from a low of 0.39/mi^2 during the time when populations are low (just prior to the annual period of pup birth) to a high of 3.55/mi^2 when populations are high (just after the period of pup birth) (Pyrah 1984, Knowlton 1972). Coyote home ranges may vary from 2.0 mi^2 to 21.3 mi^2 (Andelt and Gipson 1979, Gese

et al.1988[0]Ozoga and Harger (1966), Edwards (1975), and Danner (1976) however, observed a wide overlap between coyote home range and did not consider coyotes territorial.

The presence of unusual food concentrations and nonbreeding helpers at the den can influence coyote densities, and complicate any effort to estimate abundance (Danner and Smith 1980). A positive relationship was established between coyotes densities in mid-late winter and the availability of dead livestock (Roy and Dorrance 1985).

Each occupied coyote territory may have several nonbreeding helpers at the den during whelping (Allen, et al. 1987, Bekoff and Wells 1982). Therefore, each defended coyote territory may have more than just a pair of coyotes. Messier and Barrette (1982) reported that from November through April, 35% of the coyotes were in groups of three to five animals and Gese et al. (1988) reported that coyote groups of 2, 3, 4, and 5 comprised 40%, 37%, 10% and 6% of the resident population, respectively.

Many authors have estimated coyote populations throughout the west and elsewhere (Pyrah 1984, Camenzind 1978, Knowlton 1972, Clark 1972, USDI 1979). Exact coyote population estimates for Oklahoma are not available from state agencies. ODWC makes estimates on coyote (and furbearing mammals) population trends (e.g., decreasing, stable, increasing) based largely on information from fur harvest/sport hunting take and sighting documentation from field personnel. Another estimate suitable for purposes of analysis can be made using information on coyote biology and population dynamics and tempering the "reasonableness" of the estimate by considering field observations of WS personnel. These types of estimates of carnivore populations are based on knowledge of the species, experience, and intuition and may be as accurate as those based on more scientific methods (Fritzell 1987).

Knowlton (1972) estimated coyote densities throughout the western U.S. to be an average of 0.5 to 1.0 per square mile over a large portion of the coyote's range. The opinions of WS Specialists that work in the State, generally agree that coyote populations in specific locations naturally fluctuate, and overall coyote numbers in the State are relatively high. Based on observations from ODWC personnel and fur/sport harvest data, coyote populations statewide are considered stable (M. Shaw,ODWC, pers comm., 2004) Although not substantiated by scientific field studies, Knowlton's average of 0.5 to 1.0 per square mile can be considered reasonable for the area and is very likely much lower than true average densities across the State. Thus, Knowlton's "average" for the western U.S. is assumed to be conservative for the area in question, but is used herein for analysis.

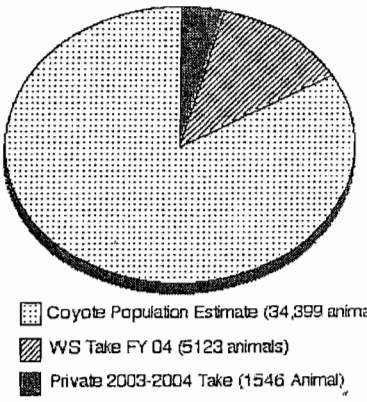

Figure 2. Summary of Coyote Take in Oklahoma

Coyotes are extremely adaptive animals, and can utilize a wide variety of habitat types, including typical woodlands, prairie and riparian areas; however, croplands and urban sprawls are also utilized to a degree, depending on the individual qualities of those habitats to support coyotes and other carnivores. From an overall available habitat/land area perspective, the only locations in the state where it could be stated that coyotes could not exist would be the 716,800 surface acres of water found throughout the state (OWRB 2004). The State is approximately 44,748,160 acres, or approximately 69,919 square miles in size. As stated, the approximately 11 million acres of agricultural cropland (OASS 2004) and the urban areas of Oklahoma City and Tulsa (approximately 523,034 acres) is utilized greatly by coyotes and other carnivores, but assumed to be lesser in quality

0 **4** All literature citations reported in km^2 have been converted to mi^2 for reader convenience and to maintain consistency.

habitat, due to actual physical space available to these animals. A conservative estimate of the total statewide coyote population (in rural areas only) for the State, based on what we believe to be a conservative assumption of 0.5 to 1.0 per square mile, would be 25,397 to 50,794 animals at any one time. Using the .5 animals per acre formula for croplands and urban areas (based on an assumed lesser habitat quality) increases those figures 34,399 to 59,796 animals at any one time (Figure 2).

Private coyote take may legally occur at any time since there is no closed season or bag limit. However, it is reasonable to assume that much of the private take of coyotes occurs in the winter period when furs are prime, and the fur market is active. Sport hunter and trapper harvest for the 2003-2004 fur harvest season was 1,546 (ODWC 2004). The WS coyote kill in the State for FY 04 was 5,123 (MIS 2004). These data indicate the total number of coyotes taken (killed) in the State was about 6,669 during 2004. Based on our range of estimates of the coyote population in the State (34,399 to 59,796), cumulative take was between 11% and 19% of the population. Using the most conservative numbers available (coyote population at 25,397 animals), the cumulative kill is 26%.

Connolly and Longhurst (1975) determined that, "if 75% of the coyotes are killed each year, the population would be exterminated in slightly over 50 years." The authors further say that their "model suggests that coyotes through compensatory reproduction can withstand an annual control level of 70%." To further demonstrate the coyote's recruitment (reproduction and immigration) ability, if 75% control occurred for 20 years, coyote populations would regain precontrol densities by the end of the fifth year after control was terminated. Furthermore, immigration, not considered in the Connolly/Longhurst model can result in rapid occupancy of vacant territories (Windberg and Knowlton 1988). While removing animals from small areas at the appropriate time can protect vulnerable livestock, immigration of coyotes from the surrounding area can quickly replace the animals removed (Stoddart 1984). Connolly (1978) noted that coyotes have survived and even thrived in spite of early century efforts to exterminate it. Based on this information, WS's impact on the coyote population in the State, even with possible under-reporting of "Other Harvest", will not affect the general coyote population in the State, because the "Total Take" of coyotes in the area is no more than 26% of the estimated population. Evaluating the data using standards established in USDA (1997) to determine the magnitude to which total harvest impacts the species, a cumulative harvest of less than 75% of the *allowable harvest level* of 70% of the population of coyotes results in a determination of "low magnitude." Thus, a "low magnitude" impact rating is achieved if no more than 52.5% of the population is taken per year. Based on the above analysis, the expected cumulative harvest rate of 11 to 19% of the coyote population in the State is well within the "low magnitude" criteria. The analysis further suggests annual coyote take could be increased by a factor of 3 to 5 before the low magnitude rating is exceeded or a factor of 3.5 to 6 before the 70% allowable harvest level would be reached. Additional supporting evidence that cumulative take is below a sustainable harvest level is offered by furbearer population trend data that indicate that coyote numbers are stable statewide, despite the numbers of animals taken in past years, and any future decline in coyote population trends would likely be the result of natural, expected population cycles (M. Shaw, ODWC pers. comm., 2004). As was previously stated by the Connolly/Longhurst model, the cumulative take would have to exceed the 75% level for nearly 50 years and be *maintained* for that length of time, a condition that is not plausible. Therefore, it is reasonable to conclude that cumulative impacts on coyote populations in general within the State are not substantial and would remain so even if the Program's lethal coyote damage management efforts were increased several fold.

In all likelihood, the population impacts shown by this analysis are less than the actual impacts. This is because WS currently actively conducts PDM on 6% of the land area of the State (in 2004), with formal agreements in place to conduct PDM on 21% of lands statewide. Thus, populations on than 74-94% of the area of the State are not impacted by WS. Also, our assumed population densities of 0.5 -1.0 coyotes per square mile are probably low because WS removed an average of 1.2 coyotes per square mile from the properties where coyotes were taken in FY 04 (MIS 2004). The slightly higher density/take on properties for which WS assistance has been requested suggests that depredation problems are more likely to occur in areas of higher coyote density within the State.

Bobcat Population Information and Impact Analysis

The confirmed and reported damage caused by bobcats in the State during FY 04 was to pets or companion animals, domestic fowl (including ducks, geese, turkeys, commercially raised pheasants quail, chickens, domestic pigeons and guinea fowl), domestic rabbits, commercially raised deer, ratites, goats, lambs, and wildlife resources. Total value of these losses was about $8,738 (MIS 2004).

Bobcats reach reproductive maturity at approximately 9 to 12 months of age and may have one to six kittens following a two-month gestation period (Crowe 1975; Koehler 1987). Bobcat population densities appear to range between 0.1 and 7/mi^2 according to published estimates. They may live up to 14 years, but annual mortality is as high as 47% (Rolley 1985).

There are no current population estimates for bobcats in Oklahoma and the range of published densities is too broad to be useful in arriving at an estimate. Population trend indices shown by ODWC (2004) indicate bobcat populations in the State increased in most habitat zones within the state between 2003 and 2004 (M. Shaw, ODWC, pers. comm. 2004). Private trapper and hunter harvest totaled about 2632 during the 2003-2004 fur season (ODWC 2004). WS kill in the State during FY 04 was low, totaling 36 animals; WS kill is a minor component of overall bobcat mortality.

USDA (1997) reported a bobcat population estimate for Oklahoma to be 25,000 in 1988. Population trends since this estimate have undergone natural cycles, as expected within any dynamic wildlife resource, but have consistently leaned toward an increasing trend over the past years as was the case in 2004 (M. Shaw, ODWC, pers comm.. 2004). USDA (1997) also reported an allowable harvest level for bobcat populations of 20%. Based on the fact that the *current* cumulative take is well below the 20% allowable harvest when compared to the 1988 estimate, and the available trend information suggests the bobcat population is increasing, it can be concluded that the numbers killed continue to be well below the desired level. Bobcats effectively utilize a variety of habitats other than established forests, including riparian areas in cities and prairies, and rough, rocky canyon areas that are not necessarily wooded; although the 12,500 square miles of forest in Oklahoma (ODAFF 2002) could be considered prime habitat for bobcats. The total habitats considered suitable for bobcats in the State would be 68,799 square miles. Bobcat take in the private sector is heavily influenced by the existing fur market; bobcat take will fluctuate as market prices increase or decline. Since WS manages only bobcat damage situations, the WS take numbers have always been low historically as compared to sport take. It is anticipated that WS bobcat take in the State would continue to be a low percentage of total take, even if Program PDM activities were doubled or tripled. Thus, bobcat population impacts of the current Program should be low and would remain low in the reasonably foreseeable future even in the event that Program activities were expanded considerably.

Raccoon Population Information and Impact Analysis

The raccoon is a member of the family *Procyonidae* which includes ringtails and coatis (*Nasua narica*) in North America. Raccoons are one of the most omnivorous of animals, feeding on carrion, garbage, birds, mammals, insects, crayfish, mussels, other invertebrates, a wide variety of grains, various fruits, other plant materials, and most or all foods prepared for human or animal consumption (Sanderson 1987). Raccoon damage problems including human health and safety concerns, both reported and verified, were documented on 82 occasions in FY 04 (MIS 2004) in the State. They accounted for about $9,512 worth of reported and verified damage to various resources and property such as domestic fowl, residential buildings and livestock feed.

Sanderson (1987) stated that absolute population densities of raccoons are difficult if not impossible to determine because of the difficulty in knowing what percentage of the population has been counted or estimated, and the additional difficulty of knowing how large an area the raccoons are using.

Twichell and Dill (1949) reported one of the highest densities, with 100 raccoons removed from a winter tree den area on 101 acres of a waterfowl refuge in Missouri during winter. Other studies have found raccoon densities that ranged from 9.3/mi^2 to 80/mi^2 (Yeager and Rennels 1943, Urban 1970, Sonenshine and Winslow 1972, Hoffman and Gottschang 1977, and Rivest and Bergeron 1981).

Past raccoon population indices in the state have suggested increases in the general population, and have indicated higher numbers than for bobcats or coyotes. The current trend is that the raccoon population is increasing (M. Shaw, ODWC, pers comm. 2004, ODWC 2004). Therefore, it is reasonable to assume an average density for the State that is at least equal to the lower end of the published ranges, or about 9 per square mile. With 50,794 square miles of suitable habitat, the total population in the State would be more than 457,000. To be even more conservative, this analysis excludes urban habitat where raccoons are prevalent.

The allowable harvest level for raccoons found in USDA (1997) was established at 49% of the total population. WS kill was 153 raccoons in the State in FY 04, and private harvest was about 7,930. The WS take is a minor part of total raccoon mortality comparatively. The cumulative take of 8,083 was only about 1.7% of our population estimate, and need to increase nearly twenty-eight fold to reach the allowable harvest level. Therefore, even under these very conservative assumptions, WS take is insignificant to the population in the State and cumulative take is minor. It is anticipated that WS raccoon take in the State would continue to be a low percentage of total take, even if WS PDM activities were doubled or tripled. Thus, raccoon population impacts of the current program should be low and would remain low in the reasonably foreseeable future even in the event that program activities were expanded considerably.

Striped Skunk Population Information and Impact Analysis

The striped skunk is the most common member of the *Mustelidae* family. Striped skunks have increased their geographical range in North America with the clearing of forests. They are not associated with any well-defined land type that can be classified as skunk habitat (Rosatte 1987), but are capable of living in a variety of environments including agricultural lands and urban areas. Skunks primarily cause odor problems around homes, transmit diseases such as rabies to humans and domestic animals, and sometimes prey on poultry. Skunks are primarily targeted to reduce these types of problems and control actions for this purpose are a minor part of State activities.

The home range of striped skunks is not sharply defined over space and time, but is altered to accommodate life history requirements such as raising young, winter denning, feeding activities, and dispersal (Rosatte 1987). Home ranges reported in the literature averaged between 0.85 to 1.9/mi^2 for striped skunks in rural areas (Houseknecht 1971, Storm 1972, Bjorge et al. 1981, Rosaette and Gunson 1984). The range of skunk densities reported in the literature was from 0.85 to 67/mi^2 (Jones 1939, Ferris and Andrews 1967, Verts 1967, Lynch 1972, Bjorge et al. 1981). Many factors may contribute to the widely differing population densities. Habitat type, food availability, disease, season of the year, and geographic area are only but a few of the reasons (Storm and Tzilkowski 1982).

There are no population estimates or trend information available for striped skunks in the state. Therefore, the lowest reported density estimates from the literature will be used to estimate skunk populations. Using this information, the estimated population in the State is conservatively estimated to be approximately 69,000 striped skunks.

WS killed 199 striped skunks in the State in FY 04. Private harvest during the 2003-2004 fur season was 81 (ODWC 2004) for the State. It is unknown how many skunks are killed each year as pests or health threats that are unreported; of the total unknown number of skunks received by the OSDH for rabies testing, 72 positives (killed skunks submitted for testing) were documented from Jan. 1,- Oct. 27, 2004 (OSDH 2004). The cumulative take of striped skunks in 2004 for all available sources was

352. An allowable harvest level has not been determined for striped skunks (USDA 1997). The cumulative take is only 0.5% of the conservatively estimated population which is believed to be of low impact. It is anticipated that WS striped skunk take in the State would continue to be a low percentage of total take, even if Program PDM activities were doubled or tripled. Thus, striped skunk population impacts of the current program should be low and would remain low in the reasonably foreseeable future even in the event that program activities were expanded considerably.

Opossum Population Information and Impact Analysis

The WS FEIS cited studies showing opossum density is highly variable depending upon habitat and ranges from 10 to 634 per square mile (USDA 1997) and determined that no allowable harvest estimates are available for opossums. In evaluating WS opossum kill for FY 88, USDA (1997) concluded that a take of 193 opossums in Oklahoma was of low magnitude and private harvest of 7,643 was of moderate magnitude in impact on opossum populations. Private harvest was 1,071 in the state during the 2003-2004 season, while WS lethal take in the State during FY 04 was 71. Therefore the documented cumulative take was 1,142 animals. Assuming opossum density is at the low end of the range shown in the FEIS, the opossum population in the State is probably about 680,000 animals. Therefore, cumulative take is less than 1% of the estimated population and believed to be of low impact.

Gray Fox Population Information and Impact Analysis

Gray fox are found throughout the State in scattered populations, but are most abundant in eastern Oklahoma. Trend indices suggest a stable population from 2003 to 2004 (M. Shaw, ODWC, pers comm., 2004). Private harvest was 212 in the State (ODWC 2004) and the WS take was 6 gray fox. Published estimates of gray fox density range between 3.1 and 5.4/mi^2 (Trapp 1978). Since populations tend to be scattered throughout suitable habitat in the State, they may be found in pockets covering 5-10% of the area as a conservative estimate. Using the low density estimate and low range of habitat hypothetically used, a conservative estimate of gray fox abundance would be about 10,600 in the State. An allowable harvest level for gray fox is 25% of the total population or 2,650 per year. The cumulative take of 218 in the State was at a 2% level which is clearly insignificant to gray fox populations.

Feral Dog Information and Impact Analysis

Feral dogs are found throughout Oklahoma. Their predation of livestock and poultry is common and widespread in the State. They were responsible for killing 30 livestock, 20 poultry and injuring one pet and one calf, and harassing livestock in the State in FY 04 (MIS 2004) where WS became involved. At times, they also prey on native wildlife such as deer, turkey, and quail. Primary responsibility for dog control rests with state and local authorities under Oklahoma laws. WS responds to requests from these entities as well as health departments. State WS personnel are authorized to control feral dogs to protect livestock, poultry, and human health and safety.

Take of feral and/or free-ranging dogs by the program is considered to be of no significant impact on the human environment since dogs are not an indigenous component of ecosystems in the State. The kill of dogs by WS is minor in comparison to the number killed by animal control and humane organizations in the country each year.

Red Fox Population Information and Impact Analysis

The red fox is uncommon statewide, but trend indices suggest populations are stable to increasing 1 (M. Shaw, ODWC, pers.comm. 2004). It is generally most common in the northeast part of the state, and often near urban areas. Coyotes are believed to influence the distribution and abundance of red

foxes; red fox avoidance of coyotes is believed to be a principal cause of spatial separation (Sargeant et al. 1989). WS took three red fox in the State in FY 04 (MIS 2004). There is a statewide "closed season" for red fox; they cannot be taken in Oklahoma for fur harvest. As a result, there is no data available in the fur harvest report. However, red fox can be taken for livestock depredations at any time (ORS 29 §5-405 Part D).

Published estimates of red fox densities have been as high as 50/mi^2 (Harris 1977, MacDonald and Newdick 1982, Harris and Rayner 1986) where there was an abundant food supply; in Ontario, population densities were estimated at 2.6/mi^2 (Voigt 1987). Others reported densities of fox dens at 1 per 3 mi^2 (Sargeant 1972). If we assumed that red fox were found at the low density, about 2/mi^2 in pockets covering 5% of the suitable habitat in the State (3,440 mi^2), this would amount to 6,880 red fox in the State. An allowable harvest for red fox is 70% (USDA 1989) of the total population or 4,816 per year. Therefore, WS take could increase significantly before an impact on the population were realized.

Badger Population Information and Impact Analysis

Badgers are uncommon to common in the western ¾ of the state. WS occasionally takes badgers as target species, most often for the protection of rangeland and pasture damage. Badgers are sometimes captured as nontarget species incidental to PDM activities. Little is known about densities other than a few intensely studied populations. Lindzey (1971) estimated that the Curlew Valley on the Utah-Idaho border supported 1/mi^2 and Messick and Hornocker (1981) found 13/mi^2 in southwestern Idaho. For purposes of this analysis, we will conservatively use the low density estimate for the State's suitable habitat or about 51,600 badgers.

Badger populations can safely sustain an annual harvest rate of 30-40% annually (Boddicker 1980) or about 20,640. ODWC reported 32 badger were taken statewide in 2003-2004 (ODWC 2004) while WS killed 7 in the State in FY 04 (MIS 2004). The cumulative take of 39 is less than 1% of the estimated harvest potential. Because this is substantially less than allowable harvest, and badger populations appear stable (M.Shaw, ODWC, pers. comm. 2004), cumulative impacts are low in magnitude.

Other Target Predator Species Impacts

Other target species taken occasionally by WS for PDM, or conflict species reported to WS in the State, are mink, long-tailed weasels, hog-nosed skunks, ringtail, spotted skunks, river otter, swift fox and feral cats. WS receives very limited to periodic complaints involving these species in the State and, occasionally, may conduct operational control to take offending animals of certain species.

Long-tailed weasels, hog-nosed skunks, spotted skunks, river otter, mink, and swift fox are limited in both number and distribution throughout the State, with the swift fox and hog-nosed skunk found only in the panhandle region of Oklahoma. During FY 04, none of these species were taken as targets in direct control operations for PDM in the State.

Feral cats are fairly common throughout the State. WS periodically takes feral cats in PDM activities, with 5 killed in FY04 (MIS 2004). The take of feral cats by the program is considered to be of no significant impact on the human environment since cats are not an indigenous component of ecosystems in the State. The kill of cats by WS is minor in comparison to the number killed by animal control and humane organizations in the country each year.

Fur harvesters took 11 mink in the 2003-2004 season (ODWC 2004). WS has historically taken mink in past years for PDM, but none were taken during 2004 (MIS 2004). No information was available

for long-tailed weasel take, but WS did not take any in recent years (MIS 2004). Even with minimal take, these populations are highly unlikely to be cumulatively impacted by WS PDM efforts.

A species of special concern in Oklahoma is the plains spotted skunk. The status of this species is currently unknown, but it has declined for a number of years. It is currently thought to be at relatively low levels throughout the state. From the time period between FY88- FY98, three target spotted skunks were taken by WS for PDM; a target spotted skunk was killed in FY 88, and two skunks in FY92, with one of those skunks relocated. There were none taken as nontargets during this time period. The last spotted skunks killed in Oklahoma by WS were three nontargets in 1999. All three of these animals were taken in northeastern Oklahoma, near the Arkansas border. The fur harvest season was closed in 1994-95, but two were taken in the five previous fur seasons by private trappers (ODWC 1995). The cumulative impact on these species by WS and private take is negligible. If WS began taking relatively large numbers of spotted skunks, WS would consult with ODWC to ensure a prudent course of action for the management of the species.

Another species of concern in the State is the swift fox, found exclusively in the Panhandle of the State in the short-grass plains region. Although classified as furbearer, there is currently a year-round closed season in regard to take of the swift fox (Hoagland, 1999). The last damage reported for swift fox was in FY 90 (MIS 1990). WS took five swift fox as nontargets during coyote PDM efforts in FY 04. Most potential impacts on swift fox from WS PDM activities in the Panhandle have thus far been limited, because current methods employed in the State (e.g., pan tension devices for leghold traps) help minimize overall nontarget take. Although they are not a federally listed species, further mitigation procedures are discussed in section 3.4.1 to increase efforts toward swift fox conservation. USDI (1995) has determined that the most immediate threat to the survival of the swift fox is from coyote predation. In western Kansas, direct predation by coyotes was the major cause mortality for adult and juvenile swift foxes in both cropland and rangeland study areas (Sovada, et al. 1998). The local reductions in coyote abundance from PDM would potentially benefit the swift fox population. Adverse impacts from limited incidental take of this species in PDM activities are, therefore, probably outweighed by the beneficial effects of local reductions in coyote abundance.

Hog-nosed skunks are found only in the western portion of the Panhandle. WS has not received a complaint or taken a hog-nosed skunk in the past 20 years. Therefore, WS PDM activities have not impacted this species. Private fur harvesters have not taken any hog-nosed skunks in the 1989-2004 fur seasons (ODWC 2004). If WS PDM is needed in the western portion of the Panhandle, it is expected that take of this species will be minimal and insignificant to the population. Take of this species, however, will be monitored. If WS began taking relatively large numbers of hog-nosed skunks, WS would consult with ODWC to ensure a prudent course of action for the management of the species.

Ringtails are another predator that is uncommon in the State and a species of concern. It is sparse in the southwestern part of the State, the northeastern edge of its range in the U.S. No damage has been reported for ringtails and none have been taken in the past 20 years by WS. The fur season for ringtails was closed in 1994-95. Because of their habitat choice and secretive nature, ringtails seldom become a problem, but have been known to become a nuisance in and around human habitations. Pan tension devices on leghold traps will exclude them in most PDM activities involving heavier target animals. If a call was received for a ringtail complaint, WS would consult with ODWC to ensure a prudent course of action for the management of the species.

The river otter are an important North American furbearer species that was eliminated from most of its range by the early 1900s. Through restoration efforts undertaken by many states, by 1998 the river otter occupied at least portions of historic range, except in New Mexico (Raesly 2001). Reasons for the decline of the river otter in the U.S. were unregulated harvest, the decline in suitable habitats, and habitat quality (pollution) (IAFWA 2002, LCREP 2004). By the 1980's, many states were engaged in

active otter conservation efforts that included otter restocking programs. In 1985, Oklahoma became a part of that effort with 20 river otter released into the wild (IAFWA 2002). A success story for that multi-state effort was the State of Missouri; between 1982 and 1992, 845 river otter were released into suitable habitats. From these releases, otters increased their distribution and abundance beyond expectation, and by 1996 the otter population had increased sufficiently to support the first trapping season. By 2001, populations throughout Missouri were estimated to be between 11,000 and 18,000 animals (McNeely and Reno. 2002).

Detecting river otter presence or estimating abundance relies on harvest records, trapper surveys, track surveys or latrine surveys. Harvest records and trapper surveys are not an option in areas where otters are protected, and some types of surveys can have limited utility, or be labor intensive (Swimley et al. 1998). Melquist and Dronkert (1985) concluded that harvest statistics provided some insight, but could be biased by pelt prices and market demand. Also, they determined that density estimates were unreliable prior to the development of a suitable telemetry technique. They complied a series of otter density studies from the literature from a number of U.S. States and Canadian Provinces and found that otter density varies with habitat, and those densities may be linear (following coastline or streams) or encompass an area such as a marsh. Linear densities ranged from 1 otter/1.18km (.73 miles) shoreline in Alaska to 1 otter/10-17 km (6.2-10.5 miles) waterway in Alberta, Canada. Densities in marsh areas ranged from 1 otter/4km^2 (2.48 miles^2) in Missouri to 1 otter/71-106ha^2 (.27-.4 miles^2) in Texas. Densities in Oklahoma are unknown at this time; however, efforts are currently underway to determine a suitable methodology for surveying otters in the state. Currently, there is no open season for trapping in Oklahoma; therefore, no private harvest record is available. The only current data for wildlife managers is the numbers of otters inadvertently captured during beaver damage management efforts. Since otter conservation efforts were initiated in Oklahoma in the 1980s, WS has taken no nontarget otters during PDM operations. WS works closely with ODWC, the lead agency for otter management in the State, to insure that otter conservation would not compromised in Oklahoma by any WS actions. Since that time, the trend in known cumulative otter take (42 in FY 04), has shown that otter populations and distribution are likely increasing. River otter are now at their highest known distribution in the State in recent history, occupying roughly the eastern one-third of the State with a small population in southwestern Oklahoma near the Wichita Mountains.

Food habit studies of otter include a number of prey species, and varies based on local needs and overall availability. Otter predominate prey is fish and crustaceans, with limited reptiles, amphibians, insects, and birds (Melquist and Dronkert 1985). WS receives a few complaints annually in regard to otter predation to aquaculture resources or property damage. In FY 04, two requests for assistance were received concerning river otter.

With evidence of an increase in both the population and distribution of river otters in State, it can be determined that current WS PDM activities have no detrimental effect on otter populations. WS will continue to work closely with ODWC to monitor river otter status statewide.

4.2.1.2 Alternative 2 - No Federal WS PDM

Under this alternative, WS would have no impact on target predator species populations in the State. However, ODAFF would probably still provide some level of direct control assistance with predator damage problems but without federal supervision. Also, private efforts to reduce or prevent depredations might increase which could result in impacts on target species populations. Impacts on target species under this alternative could be the same, less, or more than those of the proposed action depending on the level of effort expended by ODAFF and by private persons. For the same reasons shown in the population impacts analysis in section 4.2.1.1 it is highly unlikely that predator populations would be impacted significantly by implementation of this alternative. However, it is hypothetically possible that frustration caused by the inability to reduce losses could lead to illegal

use of chemical toxicants which could lead to unknown impacts on carnivore populations in general in the area.

4.2.1.3 Alternative 3 - Technical Assistance Only

Under this alternative, WS would have no impact on target predator species populations directly. ODAFF would probably provide some level of direct control assistance with predator damage problems but without federal supervision, and private efforts to reduce or prevent depredations could increase which would result in impacts on those populations. For the same reasons shown in the population impacts analysis in section 4.2.1.1, it is highly unlikely that coyote populations or other predators would be impacted significantly by implementation of this alternative. Impacts and hypothetical risks of illegal chemical toxicant use under this alternative would probably be about the same as those under Alternative 2.

4.2.1.4 Alternative 4 - Nonlethal Required Before Lethal Control

Under this alternative, WS take of target predator species would probably be less than that of the proposed action because lethal actions by WS would be restricted to situations where nonlethal controls had been tried, in most cases by the requestor, but also by WS, without success. No preventive lethal control actions would be taken by WS. For many individual damage situations, this alternative would be similar to the current program because many producers have tried one or more nonlethal methods such as predator resistant fencing without success or have considered them to be impractical in their particular situations prior to requesting WS's assistance. Without WS conducting preventive control activities, it is likely that private efforts at preventive control would increase, leading to potentially similar cumulative impacts as those of the proposed action. For the same reasons shown in the population impacts analysis in section 4.2.1.1, it is highly unlikely that statewide coyote populations or most other predators would be impacted significantly by implementation of this alternative. Impacts and hypothetical risks of illegal chemical toxicant use under this alternative would probably be the same as those under Alternatives 2 and 3.

4.2.2 Effects on Nontarget Species Populations, Including Threatened and Endangered Species.

4.2.2.1 Alternative 1 - Continue the Current Federal WS PDM Program

Nontarget species taken in the State in FY 04 were recorded as Target - Unintentional (i.e., they were listed on the agreement as target species but were taken unintentionally during efforts to take other target species) or Nontarget (i.e., they were not listed as target species on the agreement and were taken unintentionally during efforts to take target species). With this type of data recording, some species were targets in some situations and nontargets in others.

Nontarget animals killed by WS during PDM activities in the State in FY 04 included 1 badger, 2 bobcats, 50 feral/free-ranging dogs, 4 gray fox, 5 swift fox, 56 opossum, 71 raccoons, 1 porcupine (*Erethizon dorsatum*), 42 striped skunks, and 4 white-tailed deer (*Odocoileus virginanus*) (MIS 2004). During years prior to this, wild turkey and armadillo (*Dasypus novemcinctus*) have also taken accidentally in PDM activities (MIS 1993, 1994). No more than just a few of these species were taken and impacts to these species would be considered light. Thus far, impacts to nontarget species have been minimal. In many cases, uninjured nontarget animals may be simply released on site.

Mitigation measures to avoid T&E impacts were described in Chapter 3 (section 3.4.2.2). Those measures should assure that the proposed action would not impact T&E species. Those mitigation measures have also insured that nontarget take in the State remains at relatively low levels.

Nontarget take was included in the population impacts analysis under 4.2.1.1 for badgers, bobcats, feral cats and dogs, gray and red fox, opossums, raccoons, and striped skunks; it has been concluded that cumulative impacts to these populations, including the take of nontargets, was not significant. No analysis on white-tailed deer and wild turkey population impacts is presented because these species are common and abundant in Oklahoma and nontarget take by WS PDM is low enough to be intuitively insignificant to populations. The same is true for the armadillo and porcupine taken in the previous fiscal years.

Two of the species of special concern in the State are the spotted skunk and ringtail. None have been taken in recent years as nontargets. For these, and the species that have experienced a limited nontarget take (e.g., swift fox), impacts by WS PDM have been considered in the population impacts analysis section, 4.2.1.1. Minimal take of these species would not likely have significant adverse impacts. Evidence exists that small carnivore abundance typically increases in areas where coyote populations have been reduced (Robinson 1961, Nunley 1977). Thus, PDM activities in the State are more likely to be beneficial to these smaller predators.

4.2.2.2 Alternative 2 - No Federal WS PDM

Alternative 1 would not allow any WS wildlife damage management in the State. There would be no impact on nontarget or T&E species by WS activities from this alternative. However, private efforts to reduce or prevent depredations could increase which could result in less experienced persons implementing control methods and could lead to greater take of nontarget wildlife than the proposed action. ODAFF would probably still provide some level of direct control assistance with predator damage problems but without federal supervision and would continue to take nontargets but probably in lesser numbers proportionate to the decreased direct control efforts. Private individuals may trap coyotes year round and would not be restricted to mitigation measures such as, WS's self imposed restrictions, setting traps closer than 30 feet to livestock carcasses to avoid capturing scavenging birds or using pan tension devices to exclude smaller animals. Hazards to raptors, including bald eagles, and other nontargets could therefore be greater under this alternative. It is hypothetically possible that frustration caused by the inability to reduce losses could lead to illegal use of chemical toxicants which could impact local nontarget species populations, including T&E species.

4.2.2.3 Alternative 3 - Technical Assistance Only

Alternative 3 would not allow any WS direct operational PDM in the area. There would be no impact on nontarget or T&E species by WS activities from this alternative. Technical assistance or self-help information would be provided at the request of livestock producers and others. ODAFF would probably still provide some level of direct control assistance with predator damage problems but without federal supervision and would continue to take nontargets but probably in lesser numbers proportionate to the decreased direct control. Although technical support might lead to more selective use of control methods by private parties than that which could occur under Alternative 2, private efforts to reduce or prevent depredations could result in less experienced persons implementing control methods leading to greater take of nontarget wildlife. Private individuals may trap coyotes year round and would not be restricted to mitigation measures such as WS's self imposed restriction of setting traps no closer than 30 feet to livestock carcasses to avoid capturing scavenging birds or using pan tension devices to exclude lighter weight animals. Hazards to raptors, including bald eagles, could therefore be greater under this alternative. However, it is hypothetically possible that, similar to Alternative 2, frustration caused by the inability to reduce losses could lead to illegal use of chemical toxicants which could lead to unknown impacts on local nontarget species populations, including T&E species.

4.2.2.4 Alternative 4 - Nonlethal Required Before Lethal Control

Under this alternative, WS take of nontarget animals would probably be less than that of the proposed action because no preventive lethal control actions would be taken by WS. Mitigation measures to avoid T&E impacts were described in Chapter 3. Those measures should assure that adverse impacts are not likely to occur to T&E species by implementing Alternative 4.

If cooperators were not satisfied by corrective control operations by WS, private efforts to reduce or prevent depredations could increase. This could result in less experienced persons implementing control methods and could lead to greater take of nontarget wildlife than the proposed action. Private individuals may trap coyotes year round and would not be restricted to mitigation measures such as WS's self imposed restrictions of setting traps no closer than 30 feet to livestock carcasses to avoid capturing scavenging birds or using pan tension devices to exclude smaller animals. Hazards to raptors, including bald eagles, could therefore be greater under this alternative. Private individuals are not allowed to use M-44 devices. However, it is hypothetically possible that, similar to Alternative 2, frustration caused by the inability to reduce losses could lead to illegal use of chemical toxicants which could lead to unknown impacts on local nontarget species populations, including T&E species.

4.2.3 Effects of Predator Removal on Prey Populations

4.2.3.1 Alternative 1 - Continue the Current Federal WS PDM Program

WS takes several species of predators in the State as discussed in 4.2.2.1, but has the greatest impact on the coyote population (approximately 89% of the total predators removed through PDM). Since coyotes have the greatest potential impacts on prey species, (due to the feeding behaviors, food preferences, volumes consumed, etc.) much of the following information given is for coyote predator-prey relationships.

The relationship between predators and rodent and rabbit populations has been summarized in USDI (1979). Rabbit and rodent populations normally fluctuate substantially in several-year cycles. Two hypotheses attempt to explain these cyclic fluctuations: 1) rodent and rabbit populations are self-regulated through behavior, changes in reproductive capacity due to stress, or genetic changes (Chitty 1967, Myers and Krebs 1983); and 2) populations are regulated by environmental factors such as food and predation (Pitelka 1957, Fuller 1969).

Keith (1974) concluded that: 1) during cyclic declines in prey populations, predation has a depressive effect and as a result, the prey populations may decline further and be held for some time at relatively low densities; 2) prey populations may escape this low point when predator populations decrease in response to low prey populations; and 3) since rabbit and rodent populations increase at a faster rate than predator populations, factors other than predation must initiate the decline in populations.

Wagner and Stoddart (1972) and Clark (1972) independently studied the relationship between coyote and black-tailed jackrabbit (*Lepus californicus*) populations in northern Utah and southern Idaho. Both concluded that coyote populations seemed to respond to an abundance of jackrabbits. When a broad range of prey species is available, coyotes generally feed on all species available; therefore coyote populations may not vary with changes in the availability of a single prey species (Knowlton 1964, Clark 1972).

The impact analysis on rodents and lagomorphs (rabbits and hares) showed that predators generally prolong the low points in rodent population cycles and spread the duration of the peaks. Predators generally do not "control" rodent populations (Keith 1974, Clark 1972, Wagner and Stoddart 1972). It is more likely that prey abundance controls predator populations. USDI (1979, p. 128) concluded that "WS Program activities have no adverse impacts to populations of rodents and lagomorphs." USDA (1997) did not specifically deal with this issue.

Henke (1995) reviewed literature concerning coyote-prey interactions and concluded that short term (≤6 months) coyote removal efforts typically do not result in increases in small mammal prey species populations. However, longer term intensive coyote removal (9 months or longer) can in some circumstances result in changes in rodent and rabbit species composition which may lead to changes in plant species composition and forage abundance. Most PDM actions in the State are not year round but occur for short periods after damage occurs (corrective control situations) or for short periods (< 6 months) at the time of year when benefits are most likely such as the 2 -3 month period immediately preceding calving in the spring. This factor, combined with the fact that WS conducts PDM on about 21% of the land area of the State and takes predators off of approximately 6% of these lands, and kills a low percentage (11 -26% cumulative analysis) of the State's population of coyotes, means ecosystem impacts should be low in magnitude. Also, take of other carnivores that prey on rodents and rabbits such as gray fox is too low to indicate any potential for a significant effect. Evidence also exists to suggest other carnivores such as gray and red fox increase in number when coyote populations are reduced (Robinson 1961, Nunley 1977). The greatest limiting factor for swift fox has been suggested to be coyotes (USDI 1995). Therefore, even if coyote numbers were reduced significantly, other species that prey on rodents and rabbits would probably increase in number to mitigate the reduction in coyote predation on those prey species.

Other prey species of coyotes include white-tailed and mule deer, and pronghorn antelope. Under certain conditions, predators, primarily coyotes, have been documented as having a significant adverse impact on deer and pronghorn antelope populations and this predation is not necessarily limited to sick or inferior animals (Pimlott 1970, Bartush 1978, USDI 1978, Hamlin et al. 1984, Neff et al. 1985). Connolly (1978) reviewed 68 studies of predation on wild ungulate populations and concluded that, in 31 cases, predation was a limiting factor. These cases showed that coyote predation had a significant influence on some populations of white-tailed deer (*Odocoileus virginianus*), black-tailed deer (*Odocoileus hemionus columbianus*), pronghorn antelope and bighorn sheep (*Ovis canadensis*). Hamlin, et al. (1984) observed that a minimum of 90% summer mortality of fawns was a result of coyote predation. Other authors observed that coyotes were responsible for the majority of fawn mortality during the first few weeks of life (Knowlton 1964, White 1967).

Teer, et al. (1991) concluded from work conducted at the Welder Wildlife Refuge, Texas that coyotes take a large portion of the fawns each year during the first few weeks of life. Another Texas study (Beasom 1974) found that predators were responsible for 74% and 61% of the fawn mortality for two consecutive years. Garner (1976), Garner et al. (1976), and Bartush (1978) found annual losses of deer fawns in Oklahoma to be about 88%, with coyotes responsible for about 88% to 97% of the mortality.

Reductions of local coyote and other predator populations have been shown to result in increasing fawn survival of white-tailed deer (Guthery and Beasom 1977, Stout 1982, Knowlton and Stoddart 1992) and pronghorn antelope (Arrington and Edwards 1951, Smith et al. 1986). Reductions of coyotes has also been suggested to benefit small predator populations such as the swift fox (USDI 1995).

Based on the above information, it is clear that local short term predator population reductions can enhance deer populations. This could either be a beneficial or detrimental effect depending upon whether local deer populations were at or below the capacity of the habitat to support them. Since WS only conducts PDM on generally 10 % (6% in FY04) of the land area of the State in any one year, it is unlikely that effects on deer populations would be significant, except in isolated instances. The impacts are unlikely to be significant in major portions of the State.

4.2.3.2 Alternative 2 - No Federal WS PDM and Alternative 3 - Technical Assistance Only

Since Alternatives 2 and 3 would result in no WS operational programs, the potential effects would be similar and will be analyzed together. Under Alternatives 2 and 3, the impacts on prey populations from predator removal would likely be somewhat less than those of the proposed action because no federal PDM activities would occur. However, the difference is not likely to be substantial because of the following factors.

1. Private efforts to reduce coyote populations could still occur and would probably increase without WS operational activities.

2. ODAFF PDM actions could still occur without federal involvement but would likely be to a lesser extent than under a cooperative program with federal involvement. Eliminating federal involvement would probably only result in a slight reduction in the percentage of land area worked initially. However, actions would still be conducted statewide as the need for action remains unchanged. Therefore, no major change would occur in terms of potential impacts on prey populations.

3. Anticipated effects on coyote populations and other carnivore populations are expected to be minimal as identified by the analysis in section 4.2.1.

4.2.3.3 Alternative 4 - Nonlethal Required Before Lethal Control

Impacts of implementing Alternative 4 on prey species populations would not likely differ much from those of the proposed action for the same reasons identified in section 4.2.3.1.

4.2.4 Humaneness of Control Techniques

4.2.4.1 Alternative 1 - Continue the Current Federal WS PDM Program

Under this alternative, methods viewed by some persons as inhumane would be employed. Despite standard operating procedures designed to maximize humaneness as described in sections 3.4.2.4 and 2.2.3, the perceived stress and trauma associated with being held in leghold traps or snares until the WS specialist arrives at the trap or snare site to dispatch the animal, or, as in the case of an unharmed nontarget, release it, is unacceptable to some persons. Other PDM methods used to take target animals including shooting and the M-44, which results in a relatively humane death because the animals die within seconds to a few minutes.

On the other hand, if PDM under the current Program was selected, fewer livestock animals would suffer from injuries caused by depredations. Thus, a balance of sorts between the two aspects of humaneness might be achieved under the proposed action.

4.2.4.2 Alternative 2 - No Federal WS PDM

Under this alternative, methods viewed by some persons as inhumane would not be employed by WS but would likely be employed by private individuals, with the exception of the M-44 device. Use of leghold traps and shooting by private individuals would probably increase. This could result in less experienced persons implementing the use of improvised or self fabricated capture/kill methods, or commercial traps and snares without modifications such as underpan tension devices which exclude smaller nontarget animals. Greater take and suffering of nontarget wildlife could result. It is hypothetically possible that frustration caused by the inability to reduce losses could lead to illegal use of chemical toxicants which might result in increased animal suffering.

More livestock could be expected to suffer from injuries caused by depredations than under the proposed action.

4.2.4.3 Alternative 3 - Technical Assistance Only

Impacts regarding the issue of humaneness under this alternative would likely be similar to those under Alternative 2.

4.2.4.4 Alternative 4 - Nonlethal Required Before Lethal Control

The amount of suffering by target and nontarget wildlife under this alternative would likely be less than under the proposed action since preventive control activity by WS would not be allowed. However, use of leghold traps and shooting by private individuals would probably increase if depredation was not satisfactorily reduced. This could result in less experienced persons implementing the use of improvised or self fabricated capture/kill methods, or commercial traps and snares without modifications such as underpan tension devices which exclude smaller nontarget animals. Greater take and suffering of nontarget wildlife could result. The hypothetical risk of frustration leading to illegal pesticide use and its associated animal suffering is probably less than under alternatives 2 and 3 but more than under the proposed action.

Suffering of livestock because of injuries caused by depredation would likely increase under this alternative because PDM actions by WS could not be implemented until the onset of depredation.

5.0 CHAPTER 5 - LIST OF PREPARERS AND PERSONS CONSULTED

5.1 List of Preparers

Kevin Grant, Supervisory Wildlife Biologist/Asst. State Director, Oklahoma, USDA-APHIS-WS

John E. Steuber, Supervisory Wildlife Biologist/State Director, Oklahoma, USDA-APHIS-WS

Tom Hall, Wildlife Biologist/NEPA Coordinator, USDA-APHIS-WS

5.2 List of Persons or Agencies Consulted

U.S. Fish and Wildlife Service

Oklahoma Department of Agriculture, Food and Forestry
- Terry Peach, Secretary of Agriculture
- Dr. Leslie Cole, Veterinarian, Animal Industry Division

Oklahoma Department of Wildlife Conservation
- Mike Shaw, Wildlife Research Supervisor, ODWC

Oklahoma Wildlife Services
- Joe Arms, Wildlife Specialist, USDA-APHIS-WS
- Mark Thompson, Wildlife Specialist, USDA-APHIS-WS
- David Dudley, Wildlife Biologist/District Supervisor, USDA-APHIS-WS
- Michael Marlow, Wildlife Biologist/Wildlife Disease Specialist, USDA-APHIS-WS

APPENDIX A

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APPENDIX B

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
222 S. Houston, Suite A
Tulsa, Oklahoma 74127

December 10, 1999

#2-14-00-I-217

Mr. John E. Steuber
State Director, Oklahoma Wildlife Services
2800 North Lincoln Blvd.
Oklahoma City, OK 73105-4298

Dear Mr. Steuber,

This responds to your letter dated November 8, 1999, requesting concurrence with the determination that the actions being conducted by Oklahoma Wildlife Services are not likely to adversely affect any of the listed or proposed species. We have reviewed the Biological Assessment transmitted with your correspondence and concur with your determination. Therefore, unless new information reveals effects of the actions that may negatively impact listed species in a manner or to an extent not considered, or a new species or critical habitat is designated that may be affected by the proposed action, no further action pursuant to the Endangered Species Act of 1973, as amended is necessary.

Sincerely,

Jerry Brabander
Field Supervisor

SAH:sh/wslr.wpd

APPENDIX C

Federally listed Threatened and Endangered Species in Oklahoma

SPECIES	SCIENTIFIC NAME	Status	Locale	Habitat	FS Method	FS Removal
MAMMALS						
Bat, gray	*Myotis grisescens*	E	Northeast	CF	0	0
Bat, Indiana	*Myotis sodalis*	E	East	CF	0	0
Bat, Ozark big-eared	*Corynorhinus townsendii ingens*	E	Northeast	CF	0	0
BIRDS						
Crane, whooping	*Grus americana*	E,H	All	GW	0	0
Curlew, Eskimo	*Numenius borealis*	E	All	GW	0	0
Eagle, bald	*Haliaeetus leucocephalus*	T	All	GL	0	0
Plover, piping	*Charadrius melodus*	T	All	LW	0	+
Prairie-chicken, lesser	*Tympanuchus pallidicinctus*	C	Southwest	G	0	+
Tern, Interior least	*Sterna antillarum*	E	All	LW	0	+
Vireo, black-capped	*Vireo atricapillus*	E	Central	FG	0	+
Woodpecker, red-cockaded	*Picoides borealis*	E	Southeast	F	0	0
FISHES						
Cavefish, Ozark	*Amblyopsis rosae*	T	Northeast	C	0	0
Darter, Arkansas	*Etheostoma cragini*	C	North	LW	0	+
Darter, leopard	*Percina pantherina*	T,H	Southeast	W	0	+
Madtom, Neosho	*Noturus placidus*	T	Northeast	W	0	+
Shiner, Arkansas River	*Notropis girardi*	T,H	West	LW	0	+
INVERTEBRATES						
Beetle, American burying	*Nicrophorus americanus*	E	East	FG	0	+
Mucket, Neosho	*Lampsilis rafinesqueana*	C	Northeast	LW	0	+
Mussel, scaleshell	*Arkansia wheeleri*	E	Southeast	W	0	+
Pocketbook, Ouachita rock	*Leptodea leptodon*	E	Southeast	LW	0	+
PLANTS						
Orchid, Western prairie fringed	*Platanthera praeclara*	T	Northeast	W	0	+

STATUS
E - Endangered
T - Threatened
C - Candidate
H – Design. Crit. Hab.
** - Believed extirpated*

HABITAT
C - Caves
F - Forests/riparian borders
G - Grassland/range/meadow
L - Lakes, Rivers
W - Wetland/marsh/creek

FSDM - Impacts
(-) - Negative
0 - none
(+) - Positive